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Preclinical Curriculum Characteristics And Institutional Performance on NBME Part I

Robert F. Jones, Ph.D., Martha R. Anderson, Ph.D., and August G. Swanson, M.D.

Abstract—A study was conducted that analyzed the relationship between various characteristics of the preclinical curriculum and institutional performance on the Part I examination of the National Board of Medical Examiners (NBME) at a sample of 85 U.S. medical schools. Total scheduled hours per week was the single curriculum characteristic having a positive and significant relationship with institutional NBME examination performance. However, when the data were controlled by medical school selectivity in admissions and institutional policy on the taking of the examination, total scheduled hours per week failed to make a significant contribution to the prediction of performance. The results were viewed as failing to provide support and justification for intense preclinical curriculum loads on the basis that this would enhance NBME examination performance. The authors conclude that simple comparisons of schools on the basis of mean NBME examination performance are meaningless unless the entering abilities of students and school policies on the examination are taken into account. The authors also suggest that those schools that prescribe heavy and intense preclinical curriculum loads should reexamine those policies in light of recommendations of the Project Panel on the General Professional Education of the Physician and College Preparation for Medicine.

The intensity of the typical preclinical medical school curriculum, reflected in the number of scheduled hours, particularly those devoted to lectures, has been criticized by the Project Panel on the General Professional Education of the Physician and College Preparation for Medicine (GPEP) (1). The panel's report notes that there is great variability among accredited U.S. and Canadian medical schools in terms of "curriculum compression"; for example, at the extremes there is more than a threefold difference in the number of hours devoted to lectures (468 to 1,639). The GPEP panel calls for a decompressing of the curriculum, allowing more unscheduled time for independent study, reflection, and personal development. These admonitions are quite compelling, particularly in the absence of any evidence that "more is better."

For consideration by the GPEP panel's Working Group on Essential Knowledge, the authors of the present paper designed a study to investigate whether or not cur-

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riculum compression can be supported in any way by medical school performance. The authors reasoned that heavy curriculum loads emphasizing the development of a large knowledge base ought to be justified at minimum by superior performance on a knowledge-based measure. Therefore, the criterion selected for the study was scores on the Part I examination of the National Board of Medical Examiners (NBME). The report here presents the results of that study analyzing the relationship between various characteristics of the preclinical curriculum and institutional mean NBME Part I scores at a sample of U.S. medical schools.

Method

In order to obtain mean NBME Part I scores by institution, medical school deans were required to give permission to the NBME to release school data to the Association of American Medical Colleges (AAMC). Deans at all but seven schools granted permission. The three Puerto Rican medical schools were not included in the data analysis, and NBME examination scores were not available from the two newest U.S. medical schools, Morehouse School of Medicine and Mercer University School of Medicine. To assure representativeness of institutional performance, schools where fewer than 70 percent of the students took the examination as candidates were eliminated from the study. The final study sample consisted of 85 U.S. medical schools. NBME examination performance was based on results from the 1980–81 entering classes at each school.

In several medical schools, students are offered a choice of two curriculum arrangements. Usually one choice is a traditional lecture-discussion format, and the other option offers various approaches, such as independent study. When these schools were considered, the school mean score for the Part I examination was based on those students who participated in the lecture-discussion track.

The independent variables used in the study were scheduled hours per week; lecture, laboratory, and conference hours per week; and total preclinical hours. This information was obtained from the 1981–82 AAMC Curriculum Directory (2).

Several other control variables had to be accounted for in order to portray an accurate picture of how variations in preclinical curricula relate to Part I scores. First of all, school examination scores can be influenced by the student selection process, with schools enrolling more highly qualified students producing higher scores than the other schools. Therefore, for the study reported here, the school mean score of entering students on the Medical College Admission Test (MCAT) Chemistry subtest was used to determine school selectivity. This decision was based on findings from a previous study that MCAT Chemistry subtest scores were the best single predictor of a student's NBME examination performance (3).

Medical schools' policies regarding the taking of the Part I examination can also influence student performance (4). Therefore, information about each school's policy was taken from the *Curriculum Directory*, and each school was assigned to one of the following categories: (*a*) students required to take Part I and record a score; (*b*) students required to pass Part I for promotion; and (*c*) taking Part I was optional.

Medical schools vary with regard to another factor that may influence students' examination performance—the provision of an in-house review course for the Part I examination (4). From information provided by the schools, each was assigned to one of three groups:

1. Formal review course—instruction was provided in the content of basic sciences and/or test-taking skills. Courses were initiated by the school or the department.

2. Student-responsive review—individual departments or faculty members within departments provided content review at the request of one or more students.

3. No review program—students studied on their own for the examination.

The time students have to study for the examination may also exert some influence on the examination scores. In the study sample, some schools granted time away from classes for preparation. In others, students used the time between the end of the school year and the administration of the examination to study. Student affairs deans were asked to estimate the number of days available to medical students for review. These figures were then included in the study and referred to as study days.

A final control variable, research intensity of the school, was added. Conceivably, the amount of research conducted in the institution could be directly or indirectly related to either the way the basic science curriculum is structured or to NBME examination scores. The total of all research expenditures attributed to each medical school was used to measure research intensity.

Findings

Table 1 presents the results of a correlational analysis designed to show the interrelationships among the independent variables (curriculum hours), three of the five control variables (MCAT Chemistry subtest mean score, research intensity of school, and study days), and the dependent variable (NBME Part I examination mean score). The single most important predictor of a school's NBME examination performance was the mean MCAT Chemistry score of its entering students ($r = .52$, $p < .01$). Total research expenditures were significantly correlated with NBME examination performance but were also substantially correlated with school selectivity as measured by the mean MCAT Chemistry score. Among the independent variables, only total scheduled hours per week was significantly correlated with NBME examination performance ($r = .29$, $p < .01$).

The relationships between presence of a review program or school examination policies and NBME examination performance were studied using analysis of variance techniques. No differences were found among schools by the presence and type of a review program ($F = .24$, n.s.), but some small differences were found related to school examination policies. Those schools that required students to take and pass the NBME Part I examination had the highest mean score (510), followed by those schools which required students only to take the examination (498); the mean score at the schools at which the examination was optional was 492 ($F = 2.65$, $p < .07$).

The relationship between total scheduled hours per week and NBME examination performance was further explored by grouping the schools into three categories and analyzing their mean performance. Eighteen schools with 20 to 26 scheduled hours scored lowest (mean = 489), followed by 46 schools with 27 to 32 scheduled hours (mean = 504). Seventeen schools with 33 to 37 scheduled hours scored highest (mean = 517).

The strong relationship between MCAT performance and NBME examination performance and concomitantly the positive association between MCAT performance and total scheduled hours

TABLE 1

Means, Standard Deviations, and Intercorrelations Among Control Variables, Preclinical Curriculum Characteristics, and Institutional Mean NBME Part I Examination Scores for 1980–81 Entering Classes at 85 U.S. Medical Schools

Variable	Mean	S.D.	Intercorrelations							
			MCAT Chem. Mean	Research Expend. (In Millions)	Study Days	Sched. Hrs./Wk	Lecture Hrs./Wk	Conf. Hrs./Wk	Lab Hrs./Wk	Total Pre-clinical Hours
Control										
MCAT Chemistry subtest mean score	9.79	.98	1.00							
Research expenditures*	11.96	13.33	.64§	1.00						
Study days†	16.62	11.01	−.20‡	−.11	1.00					
Preclinical Curriculum										
Scheduled hours per week	28.99	4.02	.21‡	.17	.01	1.00				
Lecture hours per week	13.67	2.46	−.21‡	−.26‡	−.04	.22‡	1.00			
Conference hours per week	2.74	1.84	.10	.07	−.10	.09	−.14	1.00		
Laboratory hours per week	6.85	2.03	.18	.22‡	.03	.23‡	−.19	−.12	1.00	
Total preclinical hours	1,811.5	282.0	−.06	−.02	−.08	.50§	.29§	−.27§	.22‡	1.00
NBME Part I examination mean score	503.8	29.47	.52§	.29§	.04	.29§	.13	.01	.11	.12

* Total institutional expenditures for research, in millions of dollars.

† Estimated number of days available for examination study and review.

‡ $p < .05$.

§ $p < .01$.

per week clouded the interpretation of these results. In order to determine whether the significant positive correlation between scheduled hours per week and NBME examination performance represented a direct causal relationship or one that was simply based on the covariation of scheduled hours with MCAT scores, multiple regression techniques of analysis were employed. Variables were chosen for the regression analysis on the basis of the strength of their relationships with NBME examination scores. These were the mean MCAT Chemistry score, school examination policy (required to pass), research expenditures, and total scheduled hours per week. When these variables were entered into the regression analysis in a stepwise fashion, only the first two made a significant independent contribution to the prediction of Part I examination scores ($R = .59$). This suggested that the differences found in NBME examination performance by total scheduled hours per week were merely due to the fact that schools with a high number of scheduled hours had more able students in terms of their MCAT performance.

Discussion

The findings reported here failed to provide support and justification for heavy preclinical curricular loads on the basis that this will enhance NBME examination performance. Effective ways to increase institutional performance on the NBME Part I examination appear to be greater selectivity in admissions with respect to MCAT scores and/or a requirement that medical students take and pass the Part I examination in order to be promoted. Initiating review courses and increasing the amount of time available for students to study for the examination, at least in the way defined here, were found to have as little direct influence on performance on the examination as did the number of curriculum hours. The findings regarding the effect of the curriculum are consistent with a recent intraschool study conducted at Michigan State University (5).

Several points should be considered in interpreting the results of this study. First, the relationships found may apply only to those schools where a majority of students take the Part I examination as candidates for licensure. A number of schools were eliminated from the study because less than 70 percent of the students took the examination, for example, medical schools in Texas, where the NBME licensure sequence is not recognized. In this group of schools, the relationship between curriculum characteristics and NBME examination performance may be different. Secondly, all data collection and analyses relate to schools and not to individual students. Therefore, the results cannot be interpreted to mean that a review course will not help a selected medical student to achieve a higher NBME examination score or that in a particular school a review course may not improve student performance generally. Also, the estimated number of days available for studying for the examination may not have been a precise enough measure to indicate a relationship between time available for review and examination performance.

Two conclusions from the study are paramount. First, a comparison of institutions on the basis of mean NBME examination performance of students is meaningless unless the entering abilities of students from each school and the school's policies in taking the examination are taken into account. Second, those schools that prescribe heavy and intense curricular loads in the first two years should reexamine these policies in light of the GPEP panel's admonitions.

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Students' Clinical Contacts in Family Medicine During the First Two Years of Medical School

Allen J. Dietrich, M.D., Elizabeth Garrett, M.D., and John Caldwell, Ph.D.

Abstract—Departments of family medicine in U.S. medical schools were surveyed regarding the ongoing contact that occurs between preclinical students and either patients or physicians. Over 90 percent of those surveyed responded. Twenty-six departments provided ongoing contact between preclinical students and both patients and physicians, 42 departments provided ongoing contact with physicians only, and three departments provided ongoing contact with patients only. Based on these results, approximately 3,000 to 5,000 students in each medical school class nationally have some type of ongoing family medicine clinical contact during their first and/or second year. Rigorous evaluation of programs providing clinical exposure to preclinical students is needed to determine their impact on patient care and student learning.

An ongoing physician-patient relationship is the foundation of health care provided by physicians in many specialities (1). A review of published studies (2) and a recent investigation by Wasson and colleagues (3) provide evidence that ongoing care from an identified physician leads to certain improved health care outcomes. If ongoing care can lead to improved health, where do physicians learn or begin to learn the necessary knowledge, attitudes, and skills to provide it?

The most obvious answer is during the years of clinical training in medical school. But that training is typically hospital-based, and instruction usually occurs in four-to-12-week block rotations as a series of specialty clerkships. These experiences usually emphasize acute care and disease pathophysiology. Although patients are the cornerstone of instruction, students' contact with them is usually limited to the patient's brief hospital stay, and students have little time to perform any long-term patient follow-up. As a result, students' opportunities for experiencing ongoing care is severely limited.

The report of the Project Panel on the General Professional Education of the Physician (GPEP) (4) recognized the limitations of clinical clerkships. The panel suggested a restructuring of existing clerkships to provide opportunity to follow the course of a patient's illness. That restructuring will require a major change of phi-

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losophy and time allocation by clerkship directors, particularly those affiliated with tertiary care centers.

The preclinical years of medical school can provide experience with ongoing care, because students' schedules may be more flexible than in the clinical years, and ongoing relationships with patients are sometimes possible. The Case Western Reserve University School of Medicine Family Clinic program, originally described in 1961 (5), has provided preclinical students the opportunity for ongoing relationships with patients over the past 25 years. Experience with ongoing care also can occur through regular contact with clinical faculty members. These mentors, through example, attitude, and anecdote, have the opportunity to teach about ongoing care, especially if students also see patients during this time. Recent descriptions of such programs have come from the University of Washington School of Medicine (6) and Morehouse School of Medicine (7).

Such reports on individual programs cannot, however, provide information on the overall prevalence of programs that offer ongoing contacts with patients or physicians. Therefore, the present authors surveyed 122 departments of family medicine at U.S. medical schools to determine the percentage that provided preclinical students with an ongoing contact with a patient or patients and/or an ongoing contact with a physician in the department of family medicine.

Methods

The survey instrument was a two-page questionnaire designed to examine preclinical family medicine teaching, including whether opportunity for ongoing contact was available to preclinical students and what experiences were provided. Specific questions included: "Does any part of your required or elective curriculum result in ongoing contact over the first two years (or preclinical phase) of medical school between individual students and a specific patient or patients whom the student gets to know over time?" "Does any part of your required or elective curriculum result in ongoing contact over the first two years (or preclinical phase) of medical school between students and a practicing clinician?" If a department of family medicine did not offer opportunity for either type of ongoing contact, the respondents were asked whether another department at their school did. Other survey results regarding department of family medicine teaching in specific required and elective courses have been reported elsewhere (8).

Before mailing, the authors tested the reliability of the instrument by administering it to two faculty members at each of 10 different family medicine departments where the authors were personally familiar with the curriculum. Within each of these departments, over 95 percent of the two responses agreed. The validity of the instrument was confirmed by comparing the responses with similar data listed in the *1984–85 AAMC Curriculum Directory* (9). All relevant programs described in the directory were identified by the survey respondents.

In 1985 the individuals designated as the family practice contact by the 122 U.S. medical schools in an American Academy of Family Physicians listing were sent questionnaires, and 118 (96.7 percent) completed and returned them. Five schools that enrolled only third- and fourth-year students were excluded from further analysis. The responses of the remaining 113 schools were analyzed to identify the percentage of schools providing ongoing contacts, the characteristics of these contacts, and an estimate of the number of medical students participating nationally. This national estimate was the sum of the respondents' estimates of the number of students at their institutions who participated in these contacts in each medical school class.

Results

Students had the opportunity for ongoing contact with a patient, a practicing family physician, or both at 71 (62.8 percent) of the 113 responding schools. Twenty-nine of the 113 schools (25.7 percent) provided ongoing student-patient contacts, and 26 of the 29 also provided ongoing student-physician contacts. The remaining 42 schools offered ongoing student-physician contacts only.

The characteristics of the ongoing student-patient contacts provided are summarized in Table 1. These contacts were approximately equally divided between required and elective components. Contacts in required components were more likely to involve 90 to 100 percent of the students in an academic class. Required courses could have less than 100 percent participation when students could select among alternatives. Contacts in elective components tended to last at least six months. In both required and elective components, the contact usually occurred at least monthly. The most common formats for ongoing contact between a student and a patient were preceptorships, clerkships, or introduction to clinical medicine courses. At three of the 84 schools where departments of family medicine did not offer such an experience, the respondents indicated that other departments at the medical schools did.

Student-physician contacts were provided at 68 schools through the department of family medicine. This contact occurred at 31 schools in the required

TABLE 1

Characteristics of Family Medicine Department Programs at 29 U.S. Medical Schools Providing Ongoing Patient Contact for Preclinical Students, 1985

Characteristics	Number of Programs*	
	Required†	Elective
Percent of each academic class participating		
1–10	1	—
11–50	3	—
51–90	—	7
91–100	12	8
Not answered	1	—
Duration of contacts		
Less than 6 months	6	3
6–12 months	3	7
More than 12 months	4	3
Not answered	4	2
Frequency of contacts		
Monthly or more	11	14
Less than monthly	3	1
Not answered	3	—

* The total number in each category totals more than 29 because three departments offered both required and elective ongoing student-patient contacts. At three additional schools, departments other than family medicine offered these contacts, but these are not included in the table.

† Required courses could have less than 100 percent participation when students could select among alternatives.

curriculum and at 37 schools in the elective curriculum; and at 22 schools it occurred through the students' faculty advisers who helped with course or specialty selection. Many of the schools provided the opportunity for ongoing contacts in several curriculum components. At seven of the 45 medical schools where the department of family medicine did not offer ongoing student-physician contact, the respondents were aware that another department at their school did.

Discussion

By combining respondents' estimates for their individual schools, the authors derived a national assessment of the number of preclinical students who had the opportunity for ongoing clinical contact and who participated in each type. Of the more than 16,000 students who enter medical school each year (19), over half (8,850) enroll at a school that provides an opportunity for ongoing contact with a patient or department of family medicine physician sometime during the first two medical school years. As many as 1,900 (12 percent) of the 16,000 students actually participate in an ongoing contact with a patient, and as many as 4,200 (27 percent) participate in an ongoing contact with a physician in a department of family medicine. Overall, as many as 30 percent (4,730 of 16,000) participate in one or the other experience during their preclinical education.

Provision of ongoing contacts between students and either patients or department of family medicine physicians represents an important and common offering by departments of family medicine in U.S. medical schools. Nationally, the total of 71 schools with these preclinical offerings exceeds the total of 62 schools that required family medicine clinical clerkships (10) and the total of 37 schools in which the departments of family medicine participated in preclinical courses in introduction to clinical medicine (8). In addition, the data from the survey reported here suggest that ongoing contacts with patients or physicians, if not offered in the department of family medicine, are unlikely to be provided by another department at that school during the preclinical years.

While the data indicate that the ongoing contacts occur with sufficient frequency and duration to allow significant exposure to the ongoing physician-patient relationship, the content and impact of this exposure require further study. Others have attempted to assess the impact of participation in ongoing contacts on outcomes of medical education. Harris and Ebbert (11) found no influence on students' career choices from family physician preceptorships. The University of New Mexico School of Medicine has initiated an evaluation of a multifaceted program that includes ongoing clinical relationships (12, 13).

To assess the impact of these experiences, other innovative programs that provide ongoing contacts between medical students and patients or physicians should be described, with special attention given to long-term evaluation of their instructional methods, content, and outcomes. Evaluation of different programs should assess their impact on students' attitudes, skills, and knowledge pertaining to patients. Such studies should enable medical educators to determine whether instruction improves the ongoing care provided by medical students and the health care received by patients.

Students and department of family medicine faculty members devote considerable time and effort to contacts with each other and with patients that may promote learning and teaching about ongoing physician-patient relationships. As medical school educators evaluate and modify their programs in response to the GPEP report, they should evaluate the accomplishments of programs already providing contact between preclinical students and patients. Plans for the future should be solidly based on reports of experience from existing programs and the outcomes they have achieved.

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COMMUNICATIONS

Regional Differences in the Proportion of Women Among First-Year Medical Students in the United States

Steven J. Jacobsen and Alfred A. Rimm, Ph.D.

In 1914 women comprised only 4 percent of the students in U.S. medical schools (1). This proportion increased slowly through 1971, when more than 10 percent of all medical students were women (1). Since then the proportion of women medical students has risen at a much faster pace, reaching to more than 20 percent in 1975 and to 32 percent in 1984 (2). Furthermore, the percentage of women in the first-year class nationally in 1984 was 33.6 percent, a total that represented a threefold increase in the proportion of women first-year students during the previous 15 years, (from 11 percent to 33 percent) (1). While examining this increase for the entire country, the present authors noted regional differences in the proportion of women in entering classes. In this paper, the authors describe these differences and speculate on possible reasons for them.

Method

The data on entrants for the study reported here were obtained from the annual reports on medical education in the United States that appeared in the *Journal of the American Medical Association*. Data were collected for 1978 through 1984. The numbers of women and men students in first-year classes for each school during these seven years were recorded. The schools were then grouped into four regions as defined by the U.S. Census Bureau (3): the Northeast, the North Central region, the West, and the South. The Medical College of Pennsylvania was excluded from this analysis because its student body was at one time exclusively women and has an unusually high proportion of women. A weighted-mean percentage was calculated for each region and year. A test for a time trend was performed for each region with the use of a method described by Snedecor and Cochran (4). The proportion of women students in first-year classes for each school was tested with a Kolmogorov-Smirnov one-sample test statistic (5) and found to be normally distributed. A two-way analysis of variance with fixed effects was used to determine the effect of the year and region.

Data were obtained from the American Medical College Application Service of the Association of American Medical Colleges on the applicant pool for each school in 1985 in order to determine whether regional trends held for applicants as well as entering students.

Results and Discussion

The total number of first-year medical students during 1978–1984 ranged from 16,635 in 1978 to 17,320 in 1981. Individual first-year class sizes ranged from 25 to 357, with mean class sizes ranging from 129 in 1984 to 137.5 in 1981. The number of first-year students and the proportion of women students in each region for the seven years examined are shown in Table 1.

The South consistently had the largest total number of entering students; the South also has the largest number of medical schools. The average number of first-year students per school was: the Northeast, 141; the North Central region, 152; the South, 129; and the West, 112.

For each individual school and each region, the proportion of women generally increased with time. A chi-square test for trend was highly significant for each region ($p < .001$).

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TABLE 1

Numbers of First-Year Students and Percentages of Women First-Year Students in Medical Schools in Four Regions of the United States, 1978 through 1984*

Year	Northeast†		North Central Region		South		West	
	No. of Students	Percent of Women	No. of Students	Percent of Women	No. of Students	Percent of Women	No. of Students	Percent of Women
1978	3,937	26.90	4,854	25.22	5,703	22.16	1,840	26.90
1979	3,852	29.63	4,933	28.28	5,902	25.30	1,846	28.98
1980	4,009	30.81	4,992	28.59	5,981	26.21	1,846	32.39
1981	4,095	33.09	4,987	30.96	6,021	28.47	1,825	32.38
1982	4,090	32.66	5,002	31.57	5,943	29.51	1,817	33.90
1983	4,072	35.09	4,987	32.26	5,943	30.66	1,799	36.02
1984	4,079	35.84	4,867	33.37	5,928	31.63	1,788	35.63

* The number of medical schools in each region were: the Northeast, 29; the North Central region, 32; the South, 34 in 1978–1981 and 46 in 1982–1984; and the West, 16.

† The Medical College of Pennsylvania was not included, because it was established exclusively for women and its student body remains predominately women.

The data indicate that the proportions of women first-year students in the South and the North Central region were consistently lower than the proportions in the West and the Northeast. The proportions and trends in the West and the Northeast were similar. These differences in proportions suggest that the North Central region lags behind the Northeast and the West by two to three years, whereas the South lags behind these two regions by four to five years. An analysis of variance showed a significant effect for year and region. No significant portion of the variance was explained by whether the medical school was public or private.

The data on the applicant pool in 1985 were analyzed. The mean percentage of women applicants for each region were: the Northeast, 37.4; the North Central region, 33.0; the South, 32.4; and the West, 35.6 percent. When included in an analysis of variance as a covariate, the proportion of women applicants to each school accounted for nearly all the variance between regions and reduced regional effects to nonsignificant levels. From this analysis, it is apparent that the regional differences were due to differences in the applicant pool.

Further analyses were performed to determine whether the differences in proportions were due to one or two schools in a region having substantially smaller proportions of women in their first-year classes than other schools in the region. The extremes in proportions for the years studied ranged from 13 percent women in a class in the South in 1978 and 14 percent in a class in the Northeast in 1980 to 52 percent each in a class in the Northeast and a class in the West in 1984. These wide ranges indicate that the differences could not be attributed to only a few schools.

These regional differences in proportion of women first-year medical students may suggest a difference in women's attitudes toward pursuing careers in medicine in different regions. Women in the South and the North Central region may be more likely to opt for careers traditionally sought by women than the women in the Northeast and the West. It could be speculated that this is due to a more conservative view of the roles of women held by the women of the South and the North Central regions. A more remote possibility is that these regional differences may reflect a negative bias of women toward applying to medical schools in the South and the North Central regions.

Though there are no obvious explanations for these regional differences, it is clear that overall medical schools in the South and the North Central region have proportionately fewer women applicants and students than those in the West and the Northeast. However, during the past seven years, there has been a steady increase in the proportion of women in entering medical school classes in all regions of the United States.

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A Voice-Activated, Interactive Videodisc Case Study For Use in the Medical School Classroom

William G. Harless, Ph.D., Marcia A. Zier, and Robert C. Duncan, Ph.D.

The Technological Innovations in Medical Education (TIME) Project of the Lister Hill National Center for Biomedical Communications is exploring the use of interactive videodisc, microcomputer, and voice recognition technology to create interactive case studies of simulated patients to train second-year medical students in the introduction to clinical medicine curriculum. The integration of these technologies offers opportunities that did not exist in previous efforts to develop technology-based simulations (1–5). Specifically, the interactive videodisc allows believable dramatization of the medical situation. The users can verbally interview the patient, request physical examination and laboratory test results, or diagnose and manage the patient. Unprompted by the computer, the user determines the course of action. The real clinical situation is approximated through a probability-based decision algorithm. The probabilities that determine the occurrences and outcomes for a given situation are influenced, but not determined, by the user's decisions.

The interactive case studies are intended to be used in the classroom by the instructor rather than independently by individual students. This approach allows spontaneous class discussion about the content of the case and provides the instructor with a context for making cogent points and teaching relevant concepts. The case study gives students the opportunity to participate actively in clinical decisions, observe the results of their interventions, and discuss the implications with the instructor and their peers.

Case Study Prototype

A prototype interactive case study, "The Case of Frank Hall," has been developed by the authors and staff members of the TIME Project. The simulated patient, a 46-year-old man who presents in the emergency room following an episode of hematemesis, portrays the medical content and sociological issues related to a variety of gastroenterology problems confounded by alcoholism. The case study contains over 200 scenes depicting the patient in the hospital and significant past experiences related to his illness; elements of the physical

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National Survey of Writers of Dean's Letters For Residency Applications

Lisa I. Leiden, Ph.D., and Grant D. Miller, M.D.

Abstract—The purpose of the study reported here was to provide descriptive information about dean's letters, which are comprehensive summary letters sent near the end of students' undergraduate medical training by medical school deans to be part of the students' residency applications. Deans of student affairs at 124 U.S. medical schools were surveyed regarding composition of these letters at their institution. They were asked to describe themselves and the letters they write. Responses were received from 87 percent of these schools and provided data on types of information included in the letters, the decision to edit evaluations, student participation in the letter-writing process, use of final summary statements, cost and length of letters, and attitudes toward the development of national letter-writing guidelines. Major findings of the survey show that 97 percent of the writers allocated more space for clinical evaluations than basic science evaluations. Less than 50 percent of the writers included the student's class rank. Almost all included narrative evaluations of the student's performance during the clinical years. Negative information on students was addressed inconsistently by the writers. Eighty-five percent of the writers categorized their students in final summary statements, but many of these failed to provide descriptions of the categories used or explanatory data. The present authors make recommendations for writing more credible and useful letters.

Each year dean's letters are written for every graduating medical student in the United States as part of the student's residency application. If each graduating student applied to 10 residency programs in 1985, approximately 161,800 dean's letters were mailed (1). The cost—including writers' time, secretarial time, paper, envelopes, photocopying, and postage—obviously is great and will continue to increase as residency positions become harder to obtain and each student applies to more residency programs.

Even though dean's letters have been a traditional means of describing students who apply for residencies, few studies exist regarding their content and usefulness. Many residency program directors highly value dean's letters when ranking applicants (2, 3). Many directors consider dean's letters to be the most important document regarding applicants' abilities and predicted performances (4), while others consider dean's letters of little worth in providing information and forecasting future performances (5). Finally,

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the extent to which the letters accurately predict future performances of physicians remains dubious (6–8).

Questions continue to be raised regarding the usefulness of letters in light of their cost. Do dean's letters provide enough detailed information to enable residency directors to discriminate potentially good from poor residents (4)? Do they describe an indiscriminate "fantasyland" where all graduates are highly recommended (5)? Do letters hurt students by withholding information (9)? Conversely, are students' chances of obtaining a desired residency reduced if negative information is included? Are dean's letters ethical and fair representations of students' abilities?

The purpose of the present study was to survey the writers of dean's letters at all U.S. medical schools to determine: what information is included, how decisions are made about editing evaluations of students, the extent to which students participate in the letter-writing process, the nature of final summary statements, estimated cost of the letters, and other concerns the writers considered important.

Method

Items to be included in the survey were generated in the following way. The present authors reviewed the literature regarding dean's letters, searching for and identifying questions and concerns. These and their own concerns were discussed by the present authors at an informal workshop at the 1984 annual western regional meeting of the Group on Student Affairs of the Association of American Medical Colleges. Twenty-eight individuals who attended the workshop, including nine deans of student affairs, generated 22 major concerns regarding letters that they felt were most important. The authors used these to develop the 23 questions (with subitems) that made up the survey questionnaire.

The questionnaire asked about the content of the letters and the process of preparing them: the frequency with which particular types of student information were found in letters (for instance, extent of writer's contact with student, personal background, work and research experience, premedical academic performance, reasons for entry into medicine, reasons for choice of specialty, interpersonal skills, responsibility to others [that is, the student's accepting responsibility for his own actions, keeping agreements, and meeting obligations], class rank, extracurricular activities, nonprofessional interests, personality traits, and personal and professional growth), basic science course grades, clerkship grades, standardized evaluations of performance, narrative evaluations of performance, allocation of space to basic science versus clinical science evaluations, sources of writer's personal information on the student, negative or unfavorable information (for instance, physical illness, emotional instability, substance abuse, and ethical problems such as cheating), summary evaluation statements, student review of dean's letters, identification of writer (title, degree, and field), average length of letter, average annual number of letters sent for each student, average cost of letters for each student, use of microcomputers in producing the letters, and use of guidelines for writing the letters. Two open-ended items were used to elicit information on the source of information used to write personal statements about students and on how writers decide to include negative information. The other items asked for responses of yes, no, or sometimes or responses of never, sometimes, or always, depending upon the nature of the item. Comment sections were provided for all but two items related to length of letter and use of microcomputers.

The present authors independently reviewed the comments made on the two open-ended items and identified for each item the predominant categories of responses represented by the comments. Next, the authors discussed their individual lists of these response categories and combined them into one category list for each of the two items. Each author then independently rated each item using the defined set of response categories. Agreement between the authors' ratings was achieved for better than 90 percent of the comments for each item. Comments on which the authors did not agree in their ratings were discussed and rated a second time.

During September 1984 the deans of student affairs at 124 U.S. medical schools were sent the survey questionnaire. In cases where dean's letters were written by someone else, the recipient was requested to route the survey to the appropriate person. After a single follow-up reminder, 108 surveys (87 percent) were returned. The mean class size of the responding schools was 128, with a range of 40 to 255.

Results

The results of the survey included numerical totals for each item and content analysis of the written comments. The comments quoted in the following presentation of results were selected by the authors based upon the degree to which they represented all comments for a particular item. In cases where the comments suggested two or more major points of view, each is presented.

INFORMATION IN LETTERS

The letter writers were asked to indicate on a 3-point scale (never/sometimes/always) the frequency with which they included specific types of student information other than student grades or evaluations. The results are presented in Table 1. The respondents most often included descriptions of students' "interpersonal skills," "academic backgrounds prior to medical school," and "responsibilities to others." They least often included "reasons for choosing medicine," "reasons for choosing specialty," and statements on their "extent of contact with student."

The single area that more than 50 percent of the respondents said that they never included was class rank. Some schools did not rank their students. Other schools ranked their students but occasionally omitted such information from their dean's letters. Comments on the latter practice included: "Top ⅓ only—always." "The Dean does not want me to quote class rankings for the bottom of the class. I [indicate class rank] by quoting GPA, minimum GPA for promotion, and quoting mean GPA for the class. If it were up to me, I would give the actual rank for everybody."

Most writers included academic information. Forty-six percent reported they always included basic science grades, while 65 percent always included clinical clerkship grades. Many writers considered grades so important that they attached transcripts even though transcripts may have been independently submitted by students. Other writers provided additional descriptions of academic standing, as exemplified by comments such as: "We include a copy of the academic record which includes class rank, individual grades, N.B.M.E. scores, as well as premedical credentials, awards and honors received with each Dean's Letter." "Basic Science GPA is given in AMCAS terms, i.e., B, B+, A−, etc. Grades are given for required clerkships. Grades are given and [percent] of the class receiving that grade is also provided."

TABLE 1

Percentages of Writers of Dean's Letters Reporting the Frequency with Which They Included 15 Types of General Information on Students, 1984*

Types of Information	Percent		
	Never	Sometimes	Always
Interpersonal skills	0	6.5	93.5
Academic background prior to medical school	1.9	7.4	90.7
Responsibility to others†	0	10.3	89.7
School-related, extracurricular activities	0	13.9	86.1
Research experiences	0.9	21.3	77.8
Personality descriptions	4.6	17.6	77.8
Statements regarding professional growth	3.7	37.4	58.9
Work background prior to medical school	4.6	38.9	56.5
Personal background prior to medical school	13.9	32.4	53.7
Nonprofessional interests, such as hobbies	10.2	42.6	47.2
Statements regarding personal growth‡	3.8	65.1	31.1
Class rank	57.5	15.1	27.4
Statement about extent of contact with student	29.6	50.0	20.4
Reasons for choosing specialty	29.9	54.2	15.9
Reasons for choosing medicine	42.6	54.6	2.8

* The number of responses ranged from 106 to 108 because not all respondents answered all questions.

† This item was defined as acceptance of responsibility for one's own actions, keeping agreements, and meeting obligations.

‡ This item was defined as sense of independence, purpose, and maturity.

Other respondents, though fewer, questioned the validity of grades and transcripts: "We give all 'A' grades in preclinical curriculum." "Transcripts provide P/F grading for all courses. However, transcript sent to program directors (or others) does not list courses that were failed and later (on re-exam) passed. These are listed as 'Pass.'"

The finding that basic science grades were reported less often than clerkship grades is parallel to the finding that 97 percent of the respondents allocated more space to clinical evaluations than to basic science evaluations. Comments on this issue explained the writers' reasoning: "We only have grades in basic sciences, not written evals." "We comment on each course—basic science and clinical. The comments provided to us by clinical departments tend to be longer and therefore those sections of the Dean's Letter are longer." "I believe clinical science information is much more germane to residency program directors." "Basic Sciences are means to an end, not an end in themselves for the M.D. degree." Eighty-five percent stated that they included narrative evaluation information for each clerkship.

The questionnaire asked respondents about the evaluation forms used and the extent to which they were standardized. The evaluation forms used in basic science courses and clerkships were not always standardized within the school. However, 53 percent of the respondents reported that their basic science departments used common forms, and 63 percent of the respondents reported that their clinical departments used common forms. Their comments revealed that three situations existed concerning the presence and use of standard evaluation forms. First, some schools did not have standardized forms; that is, each department developed a unique evaluation form. Second, some schools had developed standardized evaluation systems, but these were used irregularly by departments and/or evaluators. Third, some schools had one standard evaluation form for basic science courses and another standard form for clerkships; these forms were consistently used by evaluators.

Respondents at schools that did not use standard evaluation forms were asked whether they would prefer to have such forms standardized. Fifty percent responded yes. The respondents' comments emphasized the difficulty of establishing uniform evaluation systems because of individual departments' needs to develop specific forms.

Though most respondents agreed on including narrative evaluations, they varied on the extent to which they edited these evaluations. Forty percent included unedited comments, 31 percent sometimes included unedited comments, and 30 percent did not include unedited clerkship evaluations. The respondents' comments provided reasons for the variations: "Unedited to the degree possible. Most narratives need some editing: converting sentence fragments into complete sentences, eliminating sexist comments, etc." "In most cases the entire narrative is recorded in the Dean's Letter. Sometimes it is edited for: 1) space, or 2) deleting of an inappropriate negative or of a euphoric (usually house-staff) piece of buffoonery."

The writers most often edited for grammatical errors, excessive length, and repetition. For example: "It depends entirely on length. If I get a suitable sized summary (or even individual quotes) from a department, I quote it verbatim. If they give me a solid page of comments, I have to make my own summary."

Other decisions to edit pertained to negative comments and whether their inclusion in the letter would limit a student's chances of receiving a residency position. Relevant comments included: "If comments are distinctly aberrant for the student, they may not be included." "Usually unedited comments are included from most evaluators. Comments which are judged to be 'off the wall' are excluded with the use of '. . . .'" "I extract appropriate comments, protecting students from spurious comments."

In response to a question on whether the letters identified the authors of evaluation comments, 59 percent of the respondents reported that they identified the original evaluator, 18 percent reported they sometimes identified the evaluator, and 23 percent reported they did not identify the evaluator. Comments provided by 32 percent of the respondents revealed that specific names were usually not included but that positions, ranks, or departments of the evaluators were usually given.

The writers were asked how often they reported negative information on students, including physical illness, emotional instability, subtance abuse and ethical problems, such as cheating. The responses showed that writers were more likely to discuss instances of physical illness and emotional instability than substance abuse or ethical problems (Table 2).

TABLE 2

Percentages of Writers of Dean's Letters Reporting the Frequency with Which They Included Four Types of Negative Information on Students, 1984*

Type of Information	Percent		
	Never	Sometimes	Always
Physical illness	4.2	70.8	25.0
Emotional instability	3.2	68.8	28.0
Substance abuse	32.4	28.4	39.2
Ethical problems†	24.7	34.6	40.7

* Responses ranged from 81 to 93 because not all respondents answered all questions.

† Ethical problems were defined by suggesting the example of cheating.

The writers who reported negative information in one area were more likely to report negative information in another area. Significant chi-square values ($p < .001$) were found for each comparison. Despite significant chi-square values, the percentages of writers who never included descriptions of physical illnesses and emotional problems (4.2 percent and 3.2 percent, respectively) were appreciably lower than those who never described substance abuse or ethical problems (32.4 percent and 24.7 percent, respectively). When asked to estimate the annual mean number for each problem, the writers estimated 2.2 incidences of physical illness, 1.8 incidences of emotional instability, 0.7 cases of substance abuse, and 0.8 cases of ethical problems.

In addition, the writers were asked to describe briefly how they decided whether to include negative information in their letters. Ninety-two percent of the respondents provided 122 separate comments on this issue, with some writers making more than one separate comment. Thirty-four percent of the comments indicated that decisions to include negative information were based on the extent to which the event or issue had affected a student's performance during medical school or could affect a student's performance as a resident. Delays or interruptions in schooling were frequently cited as evidence of how performance was affected. Another 18 percent of the comments indicated that some writers included problems that had resulted in repeated negative evaluations, as explained by the following comments: "If a recurrent theme." "If it is obvious or is commented on by more than one independent observation in more than one setting."

Eleven percent of the comments indicated that the decision to include negative information was based on whether the problem was disclosed in the official academic file. For example, administrative action may have been taken and documented, or a problem or problems may have been included in official evaluation reports. Inclusion of such data in official files apparently indicated that the problem was proven to exist. Another 9 percent of the comments indicated that writers described negative student problems in their letters without the benefit of guidelines. And finally, 7 percent of the comments were from writers who felt that no inclusion was necessary because problems result either in dismissal, in which case no letter is needed, or in problem resolution, in which case no problem exists.

Dean's letters are often concluded with a final summary statement evaluating the student's overall abilities. Eighty-five percent of the respondents included such a statement in their letters. However, only 24 percent of the respondents gave the percentage of students falling into each category used to describe abilities, such as "Above Average = 25%, Average = 50%, Below Average = 25%."

Nearly one-third of the respondents commented on the use of final statements, and many of them described the categories used in their dean's letters: "Outstanding, excellent, very good, good." "Recommend, recommend highly, recommend very highly, recommend in highest terms." "Strongest of year = 1 [percent], very strong = 9 [percent], strong = 28 [percent], very good = 44 [percent], good = 15 [percent], recommend = 2 [percent]." "Recommend with enthusiasm, recommend with confidence, recommend without reservation, recommend for consideration, recommend with reservation, do not recommend."

LETTER-WRITING PROCESS

Deans of student affairs were primarily responsible for writing dean's letters at 58 percent of the responding schools. At 3 percent of the schools, the letters were written by deans of academic affairs; at 3 percent, they were composed by a committee of faculty members; at 2 percent, they were written by the student's faculty adviser; and at 1 percent they were written by the dean of the medical school. A response category labeled "other" was selected by 33 percent of the schools. The respondents' comments indicated that in these latter cases other deans or administrators were responsible for and might share the writing task, often with the help of an administrative assistant.

At the 60 responding schools where a single individual had the responsibility for writing dean's letters, 72 percent of the writers were physicians. Thirty-five percent of these physicians were internists, 20 percent were psychiatrists, 10 percent were pediatricians, 3 percent were neurologists, 3 percent were gynecologists, and 29 percent were in other medical disciplines (for instance, pathology, surgery, or family practice). Eighteen percent of the writers held Ph.D. degrees in basic science fields, typically in physiology and anatomy, and an additional 10 percent had Ph.D. degrees in other disciplines, such as psychology.

The writers were asked to list three sources of information used to write personal statements that referred to students' personal growth in medical school, leadership capabilities, maturity, responsibility to others, and interpersonal skills. The source most often cited was written student evaluations, usually found in the students' academic files. Other sources, listed in the order the respondents most frequently listed them, were personal conferences and interviews, student-composed biographical statements, complete student files, personal knowledge of student, and other information from faculty and administrative records.

The respondents were in strong agreement over students' review of drafts of dean's letters. Eighty-two percent of the respondents gave students at least one opportunity to review their letter. The respondents' comments suggested that the word "review" may hold different meanings for different writers. At some schools, "students must initiate the request"; at others, the letter "will not be accepted by my office unless the student has signed [to acknowledge having reviewed] it." The sections of the letter that the student was permitted, encouraged, or asked to review also varied. Comments included: "They change little, but I always accept changes in 'my opinion' statements. No fact changes, of course." "They may change errors of fact, but not opinions." In summary, there was high agreement among writers that students should review their dean's letters but disagreement about what changes students may make.

The mean length of letters reported by the responding schools was 2.5 singlespaced pages. Four percent of the schools sent letters that were one page long or less; 53 percent sent two-page letters; 30 percent sent three-page letters; and 14 percent sent letters that were four pages long or more.

An average of 16 dean's letters were mailed for each student. Examples of the ranges and respondents' comments were: For 10–30 letters on average—"Hard to 'average.' Depends on field of choice, couples match, etc. We send out whatever they ask for." For 18 letters on average—"Number sent out for Orthopedics and Ophthalmology averages 25–30." For 12–20 letters on average—"This year's total will be highest ever. Number increases each year and seems to be taking a big jump this year." "Varies considerably." For 35 letters on average—"Too many." For 12 letters on average—"Maximum 44. Total for 1984 graduating class = 2710."

The writers were asked to estimate the cost per student of preparing dean's letters by taking into consideration the number of staff members, hours of labor, and materials involved in producing the letters. Only 52 percent of the respondents provided estimates, and the mean estimated cost per student was $125, with a cost range of $10 to $750 for each student. The comments made by the 55 percent of the respondents who commented on the issue indicated that many had no idea of the cost and had never made an estimate. Comments included "incalculable" and "afraid to find out."

Fifty-four percent of the schools used microcomputers to prepare the dean's letters. Comments by the respondents who did not use microcomputers revealed that many of them used other computer systems, such as minicomputers or mainframe computers. If this latter group is included, the proportion of writers using computers totaled 68 percent.

Forty-seven percent of the respondents used written guidelines developed at their institution in preparing dean's letters. The comments of those who did not use guidelines suggested that, while written guidelines might not exist, standard formats were often used. When asked whether they would favor national written guidelines, 60 percent stated that they would not. Their disapproval was based upon uncertainty about whether a consensus could be reached, whether guidelines would be followed if enacted, and whether guidelines would be able to integrate interschool variability in curricula and grading systems.

The writers were given an opportunity to list and discuss letter-writing concerns that had not been addressed in the questionnaire. Issues mentioned ranged from worry over the ever-increasing numbers of letters sent out each year to the heavy work load required to prepare them. Three issues concerned most of the 54 writers who addressed this question: the pressure for earlier and earlier letters, the value of the letters, and the challenge of writing appropriate or representative letters for each student.

Discussion

The purpose of the study reported here was to determine how dean's letters are composed at U.S. medical schools and what information they contain. One clear finding from this study was the strong commitment and dedication that the writers had for the task of writing dean's letters. This commitment was apparent in the high response rate (87 percent) and lengthy and numerous comments, even though the survey was mailed in September, the peak of the season for writing dean's letters. The high response rate also may reflect the need for the information provided by this study or may indicate the survey's value as a therapeutic release from the task of writing.

The authors feel that a number of specific problems were highlighted by this study. They include: (*a*) basic science grades and evaluations were reported less often than clinical grades and evaluations; (*b*) some writers edited or summarized narrative evaluations to the extent that the letter's credibility was questionable; (*c*) most writers were hesitant to mention impairments or include information on failed courses; (*d*) letters did not always document leaves of absences or administrative actions; (*e*) some writers gave class rank for top students only; (*f*) approximately 40 percent of the evaluations used were not standardized; (*g*) many final summary statements contained only positive descriptions; (*h*) final summary statements often categorized students' capabilities but did not describe the percentage of class members in each category; and (*i*) letters were often too brief.

It was not surprising to the authors to find such problems since no national guidelines exist. Despite the lack of guidelines, however, many schools follow similar procedures in composing dean's letters. For instance, 91 percent of the respondents included descriptions of students' premedical academic backgrounds, and 65 percent provided all clerkship grades.

The provision of more information on clerkships than on basic science course work may be explained, in part, by the lack of narrative evaluations provided by most basic science courses. Additionally, since 72 percent of the letter writers in this survey were physicians rather than basic scientists, the physicians may have attributed greater importance to clerkship evaluations.

Writers who emphasize clerkship grades and evaluations may assume that basic science grades and evaluations are of little value in predicting future performance. This may be an erroneous assumption, since early identification of problems of students may be made during the basic science years, as reported by the first author in a paper presented at the 1982 Conference on Research in Medical Education of the Association of American Medical Colleges and as discussed at a symposium headed by Dr. Ronald Franks of the University of Colorado School of Medicine at the 1985 Conference on Research in Medical Education.

The issue of editing narrative evaluations appears to be complicated. The burdensome task of deciding which information to include or exclude and which material to edit confronts writers with any letter. The respondents' comments suggest that writers typically adopt their own definitions of editing. For some, editing means condensations necessary to achieve succinctness; for others, it means minor grammatical corrections; and for still others, it means a judgment on the validity of the evaluations themselves. These variations offer a partial explanation for the finding of low agreement among respondents over including unedited narrative evaluations. It is clear, however, that editing is widespread and is done for practical reasons and as a way to obscure information.

Policy differences among schools on what information to include and how much to edit may be related to varying loyalties of writers to students. When a writer is loyal to students, exclusion of negative information and editing to present the most favorable impression may occur. When a writer is more concerned about the student's future patients, unedited narrative evaluations, some containing unfavorable comments, may be included.

Regarding potentially negative student information, the writers were more likely to discuss physical illness and emotional instability than substance abuse and ethical problems. Information was withheld ostensibly to improve a student's chances of obtaining a residency. Findings from the survey suggest that some letter writers omit negative information in spite of the fact that, as Yager reported (10), some residency program directors have noted inconsistencies in letter-writing standards and in some cases have written to medical school deans alerting them of their concerns.

The issue of giving information on students' class rank continues to be controversial. One study (11) showed that students whose dean's letters do not include class rank received lower rankings from one residency program than students whose class ranks were included. Data from the present study indicate that inclusion of class rank depends on whether a school ranks its students and on whether the school feels it is beneficial to include such information for each student. The authors believe that writers should include students' grades and the grade distributions for each course.

The issues surveyed and reported here illustrate the complex task that confronts the letter writer, a responsibility that traditionally has been passed from one student affairs dean to the next, possibly without any training being provided. The task of letter writing, especially for large medical classes, may well be too difficult for a single individual, especially when nagging ethical decisions arise. The authors feel that national guidelines could be a useful mechanism for handling these difficulties. In addition, individual medical school administrations should take a larger and more active role by creating school policies on which information should be included and how questions are to be addressed. At the very least, including more than one person in the letter-writing process would foster a wider awareness of the difficulties inherent in letter writing and minimize bias by writers.

To increase the credibility and usefulness of dean's letters, the present authors suggest that writers: (*a*) express the extent of the writer's contact with students and, if personal contact is very limited, consider altering the process so that those knowing the student write the letters; (*b*) write a personal description of the students that addresses their interpersonal skills, integrity, and sense of responsibility; (*c*) take steps to develop uniform evaluation forms and procedures within each school; (*d*) include unedited evaluations from both basic science courses and clerkships; (*e*) provide the grade distribution for each course, but do not give class rank; (*f*) document leaves of absence, failed courses, administrative actions, and problems that may affect treatment of patients; (*g*) provide a distribution of ratings or categories to help assess the meaning of final statements; (*h*) allow students to review drafts of their letters and have them sign release statements; and (*i*) furnish curriculum vitae that include extracurricular and leisure activities, transcripts, and personal statements as addenda to the letter.

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Policies of U.S. Medical Schools on the Use Of the NBME Part I and Part II Examinations

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Abstract—The study reported here provides information on National Board of Medical Examiners (NBME) examination policies from all U.S. medical schools ($n = 67$) that require students to pass the examination. Most of these schools have similar policies on use of a 380 total score as the passing level for the NBME Part I examination, allowing three attempts to pass the examination, interrupting a student's progress into the clinical curriculum upon failure of the examination, officially providing time for preparation for taking the test, and requiring students to pass the Part II examination.

Each year some students fail the Part I examination of the National Board of Medical Examiners (NBME), and most of them have their medical education interrupted as a consequence. Medical school promotions boards, deans, and students experience significant problems dealing with the practical and psychological effects of these examination failures. Inevitably, stories have circulated about how "other schools" handle the use of NBME examinations "better." For administrators, faculty members, and students who confront this situation, these anecdotal stories can raise questions about their school's policies. Before schools consider questions that could result in policy change, however, they need to know more about what really happens at other schools.

The Association of American Medical Colleges (AAMC) (1, 2) provides some information on schools' policies on using the examinations, but it is limited to noting each school's requirements for taking and/or passing the examinations. In the last 10 years the number of schools requiring students to pass the NBME Part I examination has increased from 40 to 67 (1, 2). Hyde and colleagues (3) reported variations in performance on the examination based on the school's requirement policies. Litzinger and Welker (4) observed that most schools that required students to pass the Part I examination further required students who failed it to delay progress into the clinical curriculum. Other than these studies, little has been written on the specific policies of schools that require students to pass the Part I examination. In the present study, the author sought to provide information on medical schools' policies regarding use of these examinations.

Methods

A questionnaire was constructed by the author to gather information about the

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policies and practices of the 67 U.S. medical schools that require students to pass the NBME Part I examination. The 10-item questionnaire asked whether the passing score required was based on the national passing level of 380 or on local norms. It asked whether students were required to pass each subtest of the examination, how many times students were sponsored to take the examination, whether the student's progress in the curriculum was interrupted if the student failed the test, how much time was officially allocated for review for the examination, and how many students had been dismissed primarily due to failure on the examination. Two items were related to the NBME Part II examination.

In November 1985 the questionnaire was mailed to the 67 U.S. medical schools that required students to pass the NBME Part I examination, as reported by the AAMC (1). The schools were asked, at their option, to send a copy of their written policies with the returned questionnaire. Follow-up telephone interviews were conducted in February 1986 with representatives from schools that did not return the questionnaire.

Results

From the initial mailing, 85 percent (n = 57) of the questionnaires were returned. The remaining 10 schools were contacted, and the questionnaire was completed by telephone. Therefore, the data presented here include all schools that required students to pass the NBME Part I examination in 1986. Table 1 presents a summary of the responses to the questionnaire.

The questionnaire asked for open-ended elaboration on the item concerning the interruption of a student's progress in the curriculum. These responses fell into two major categories—schools that required a student who failed the examination to withdraw from the curriculum immediately and schools that allowed the student to progress in the clinical curriculum prior to passing the examination on a second attempt. Of the 57 schools where failure caused an interruption in a student's progress, 38 schools (67 percent) required these students to withdraw completely until they passed the examination. In the second category, 19 schools (33 percent) allowed students to take some but not all of their clinical work prior to recording a passing score.

Regarding time officially allocated to study for the examination, there were 46 quantifiable responses; these showed an average of 3.2 weeks of study time. This average does not include the 16 schools (24 percent) that reported no time allocated for study.

Twenty-four schools reported a total of 68 academic dismissals related to failure on the Part I examination during the three years prior to the survey. The dismissals took place after the students had failed the examination from two to four times.

Six dismissals at three schools during the three years prior to the survey related to failure of the NBME Part II examination. Three other students at one school were delayed in graduation because they failed the Part II examination.

Information from the survey indicated a relationship between a requirement for passing the NBME Part I examination before promotion to clinical courses and academic dismissals because of failures on the examination. That is, for the 10 schools at which promotion was not contingent on passing the examination, no students had been dismissed during the past three years because they had failed it. As noted previously, some students at 24 of the other 57 schools had been dismissed during the same period because they had failed the NBME Part I examination.

TABLE 1

Percentages of 67 U.S. Medical Schools with Specific Policies on the Use of the National Board of Medical Examiners (NBME) Part I and Part II Examinations, 1986

Policies	Percent			
	Yes	No	No Response	Other
Part I examination				
Use national norms for passing score	90	10		
Use local norms for passing score	9	3	88	
Require passing of each subtest	6	91	3	
Sponsor second attempt automatically after one failure	78	22		
Sponsor third attempt automatically after two failures	66	34		
Interrupt student's progress into clinical curriculum after failure	85	15		
Allocate time officially for review	75	24	1	
Have dismissed students in past three years for failing examination	36	58	1	5
Part II examination				
Require passing	72	27	1	
Have dismissed students in past three years failing examination	6	82	11	1

Nine of the 23 schools that did not automatically allow students a third attempt to pass the test dismissed 38 students who had failed the examination during the past three years. Of the 44 schools that did automatically sponsor a third attempt, 15 schools dismissed 30 students who had failed the examination during the same period. Proportionally, then, the schools that did not automatically sponsor three attempts to pass the examination dismissed more than twice as many students who failed it than did the schools that automatically sponsored three attempts.

Discussion

Most schools that required students to pass the Part I examination were similar in: defining the passing score at 380, using total score rather than subtest scores to determine passing, allowing three attempts to pass, interrupting progress in the curriculum when a student failed, providing time for preparation for the test, and requiring students to pass the NBME Part II examination. However, there were differences in policies among the medical schools.

The lack of dismissals because of failures on the examination at schools without a promotion requirement raises some questions. Since these schools required passing the examination for graduation and since they had not dismissed students, they must have had a high success rate in students passing the test at some point. Does the promotion requirement have an adverse effect on the ability of students to pass the Part I examination? It is possible that some inherent factor reduces students' anxiety about the examination when promotion is not at stake and that, therefore, the students perform better on the examination. The author has counseled many students whose anxiety has seemed to interfere with their preparation for and performance on the examination. Further, students who begin clinical training before passing the examination may better learn many basic science concepts after exposure to their application in the clinical setting. If either of these latter two explanations is true, the schools that require students to pass the NBME Part I examination for promotion should reexamine that policy.

Most of the schools routinely allowed students three attempts to pass the examination. Some, however, were more restrictive and, consequently, reported more incidences of dismissals. On the other hand, some schools were even less restrictive and reported instances of exceptional cases where they petitioned the National Board of Medical Examiners to allow students to take the examination a fourth time. The author believes, based on the policies reviewed, that differences among schools on the number of times allowed for taking the examination reflect differing opinions regarding the importance of the examination in measuring overall student competence. More dismissals at schools that allowed fewer attempts suggest a strong commitment to the examination's value in measuring student competence irrespective of other academic measures.

The schools that required students to pass the NBME examinations for promotion displayed more similarity than dissimilarity in policies on issues related to the examinations. In the author's opinion, the similarity developed because of logistical reasons. On one hand, withdrawing the students from the curriculum is important in order to allow the students ample study for retaking the examination. On the other hand, not withdrawing the students from the curriculum may be important for scheduling reasons, since clerkships are begun at many schools before examination scores are available. Therefore, schools with similar curriculum structures may have similar policies concerning the examinations. Differences among U.S. medical schools in policies on the use of NBME Part I and Part II examinations are less notable than the similarities, but they probably reflect real differences in faculty opinions on the value of the examinations and differences in logistical concerns.

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Mental Health Education In Three Primary Care Specialties

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Abstract—The authors used a questionnaire to examine the characteristics of the mental health components of residency training in traditional internal medicine, primary care internal medicine, and family practice. Traditional internal medicine programs relied almost exclusively on the consultation method and inpatient facilities, offered little formal instruction, used the psychiatrist as the primary teacher, and spent considerably less per resident for mental health training than the other programs. Psychologists and social workers as a group were the primary mental health teachers in family medicine residencies. Traditional internal medicine programs emphasized psychophysiological reactions and simple pharmacotherapy, while primary care internal medicine and family practice programs concentrated on life cycle issues, psychosocial awareness, and simple psychosocial management techniques. None of the three types of residencies focused on complex psychiatric disorders or management techniques. The three specialties differed significantly ($F = 13$, $p = .0001$) in the total amount of time on average the resident spent in formal mental health instruction. The need for evaluation of the outcome of training is also discussed.

The role of psychiatry in the mental health training of residents in primary health care has never been clearly defined from either the perspective of psychiatry or of the primary care specialties. But data are available that stress the need to reevaluate psychiatry's contribution to mental health training in this sector of medicine. The President's Commission on Mental Health (1), citing the work of Regier and colleagues (2), and more recently the epidemiologic catchment area study (3) indicate, respectively, that 15 percent and 18.2 percent of Americans experience diagnosable alcohol, drug abuse, and/or mental disorders in any six-month period. Of these individuals, 8.3 experience anxiety disorders; 6 percent, affective disorders; 5 percent, alcoholism; and 29 percent, drug abuse.

Despite the fact that 60 percent of the individuals with such disorders are seen only in the primary care sector, primary care providers rarely recognize these disorders; and once identified, the disorders

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are frequently not treated or referred appropriately (4–6). Several circumstances keep mentally ill patients within the domain of the primary care physician. First, the number of medical students who entered the specialty of psychiatry declined significantly from 1970 to 1981 (7). Through the 1990s, psychiatry will continue to experience a shortage, with insufficient numbers to deal with even the major psychiatric syndromes (8). Furthermore, many patients with significant mental disease remain reluctant to use the services of a psychiatrist. That the usual cost of a psychiatrist per visit is greater than the cost of a primary care physician per visit further fosters patient resistance. Consequently, the majority of mental health care is delivered by physicians other than psychiatrists.

Since some studies (9) have demonstrated that 15 to 50 percent of all patients who visit primary care physicians evidence some emotional or cognitive disorder, psychiatry's role in the general health sector needs to be defined. The question of psychiatry's role was also raised in a report (10) that described the effect of behavioral factors on the development, onset, course, and treatment of physical disorders. Furthermore, investigators have reported (11) that psychological interventions in general health care settings not only improved overall care but also reduced total health care costs. Although the American Board of Internal Medicine, the American Medical Association, and the American Academy of Pediatrics have advocated mental health training for their members, the place of psychiatry in these training programs remains uncertain (12).

In the present paper, the authors describe the characteristics of the mental health components of residency training programs in three primary care specialties: traditional internal medicine, primary care internal medicine, and family practice.

Methods

In order to evaluate mental health training in these three primary care specialties, in 1984 the authors developed a study based on a sample drawn from 50 primary care internal medicine, 400 family practice, and 400 traditional internal medicine residency programs. All 50 primary care internal medicine programs were selected for the study; using random sampling techniques, the authors selected 100 family practice programs and 100 traditional internal medicine programs.

A questionnaire was developed and tested at 35 primary care training programs not included in the 250 programs selected for the study. The questionnaire contained 49 open-ended questions that asked for information concerning mental health training: methods of teaching, disciplines of teachers, administrative organization of the program, content taught (with definitions of types of content provided), use of evaluation, kinds and amounts of funding, and demographic characteristics of the residents. To facilitate visits by the authors, the 35 programs selected to assist in developing the questionnaire were in the northwestern United States. When the authors visited the sites of these programs, they asked the program directors to respond to the questions and comment on their clarity, completeness, and need for refinement. Based on their comments, additional categories of content and skills taught were added: techniques for interviewing families and understanding family systems, sexual dysfunction, and mental health issues in geriatrics.

After these revisions were made, the questionnaire was mailed to the program directors of the 250 programs chosen for the study. In a preliminary telephone call, the investigators announced that a survey form would be sent and encouraged the directors to call for assistance if needed. If a program director did not respond within four weeks, a second telephone call was made. Of the 250 programs, 42 in primary care internal medicine, 67 in family practice, and 38 in traditional internal medicine responded, for a total of 147.

Chi-square and analysis of variance techniques, discriminant function analysis, and Duncan's multiple range test were used to analyze the responses.

Results

Traditional internal medicine programs used the consultation of a psychiatrist for an average of 67.9 percent of their mental health training, while primary care internal medicine and family practice programs used the psychiatric consultation for 30 percent and 22.5 percent, respectively, of their mental health teaching (significant for each comparison, $F = 41$, $p = .0001$).

Sixty-five percent of the family practice programs used some form of block rotation in a mental health facility, compared with 25 percent of the primary care and 13 percent of the traditional internal medicine programs. Family practice and primary care internal medicine were significantly different from traditional internal medicine (chi-square = 33.3, $p = .0001$) and from each other. Traditional internal medicine programs performed 80 percent of their teaching of mental health knowledge using inpatients, while primary care internal medicine and family practice used inpatients 25 percent and 18.7 percent of the time, respectively (significantly different from traditional internal medicine, $F = 70$, $p = .0001$).

The three specialties differed significantly ($F = 13$, $p = .0001$) in terms of the total amount of time during the residency the average resident spent in formal instruction in mental health: lectures, specific conferences, scheduled case conferences, encounter groups with patients, and Balint groups. (Balint groups are twice monthly training groups for primary care physicians led by a psychiatrist.) In regard to the disciplines of the teachers of mental health issues, several significant differences were observed and are shown in Table 1. The three specialties differed in the extent to which they used psychiatrists, psychiatry residents, psychologists, and primary care physicians as teachers of mental health.

The three specialties were significantly different with regard to their administrative affiliation (chi-square = 63, $p = .0001$). Traditional internal medicine was much more likely to have the hospital's department of psychiatry administer the mental health training (80 percent) than were family practice and primary care internal medicine programs, where 49 percent and 41 percent of the training, respectively, was administered jointly by the department of psychiatry and the primary care specialty involved and 42 percent and 43 percent, respectively, solely by the primary care specialty.

The three specialties also differed significantly in the relative emphasis placed on areas of mental health knowledge and skills. This was particularly true of the areas of life cycle issues (for example, the birth of a child) and the organic mental syndrome, as shown in Table 2. Similarly, they differed in their emphasis on skills, particularly complex psychosocial management and specialized psychotherapies, as shown in Table 3.

Twenty-three percent of the traditional internal medicine programs had no eval-

TABLE 1

Mean Percentages of Teachers of Mental Health Issues and Skills in Family Practice, Primary Care Internal Medicine, and Traditional Internal Medicine Residency Programs, by Profession of Teachers, 1984

Profession	Residency Programs*		
	Family Practice ($n = 67$)	Primary Care Internal Medicine ($n = 42$)	Traditional Internal Medicine ($n = 38$)
Psychiatrists	18.7	39.0	61.0
Psychologists	37.0	11.6	6.0
Social workers	18.0	17.0	8.0
Nurses	.8	3.0	2.0
Psychiatry residents	0.0	3.0	13.0
Primary care physicians	15.5	20.0	6.0
Clergy	1.0	.3	.1
Other professionals†	8.0	6.0	3.0

* The three specialties differed significantly in terms of using psychiatrists ($p = .001$), psychologists ($p = .05$), psychiatry residents ($p = .01$), and primary care physicians ($p = .001$).

† Other professionals included sociologists and mental health technicians.

TABLE 2

Percentage of Mental Health Training Time Devoted to Teaching 10 Knowledge Areas in 67 Family Practice, 42 Primary Care Internal Medicine, and 38 Traditional Internal Medicine Residency Programs, 1984*

Knowledge Areas‡	Residency Programs†		
	Family Practice	Primary Care Internal Medicine	Traditional Internal Medicine
Sociocultural issues	6.9	14.0	5.4
Life cycle issues	22.6	10.0	6.8
Behavioral health risks	12.4	10.4	9.4
Psychophysiologic disorders	14.9	14.0	13.0
Organic brain syndromes (other than geriatric)	6.5	10.0	14.3
Anxiety and depressive disorders (nonpsychotic)	16.8	16.5	12.3
Complex psychiatric disorders	7.0	8.3	7.7
Alcoholism and substance abuse	9.5	10.7	13.2
Sexual dysfunction	7.4	6.6	5.3
Mental health issues in geriatrics	5.6	6.6	7.0

* Respondents were asked to give information on time so that it would total 100 percent, but some responses for family practice and primary care internal medicine programs exceeded 100 percent, while some responses for traditional internal medicine programs totaled less than 100 percent.

† The three specialties differed significantly in terms of time devoted to life cycle issues and organic brain syndromes ($p = .001$).

‡ The knowledge areas were defined in the questionnaire.

TABLE 3

Percentage of Mental Health Training Time Devoted to Teaching Nine Skills in 67 Family Practice, 42 Primary Care Internal Medicine, and 38 Traditional Internal Medicine Residency Programs, 1984*

Skills	Residency Programs†		
	Family Medicine	Primary Care Internal Medicine	Traditional Internal Medicine
Awareness of psychosocial issues	15.8	15.3	11.3
Techniques for interviewing patients	14.3	16.7	12.0
Techniques for interviewing families and understanding family systems	10.4	6.9	5.2
Diagnosis, detection, and referral	12.0	14.5	16.4
Simple psychosocial management techniques	17.0	16.0	15.0
Complex psychosocial management techniques	7.5	4.0	3.4
Simple pharmacotherapy	11.7	16.5	24.0
Complex somatic treatments	4.2	3.0	3.9
Specialized psychotherapies	7.0	4.0	3.2

* Respondents were asked to give information on time so that it would total 100 percent, but some responses for primary care internal medicine and traditional internal medicine totaled less than 100 percent.

† Significant differences were found among the three types of residencies in the skills of complex psychosocial management techniques ($p = .0001$) and specialized psychotherapies ($p = .0006$).

uation methods to test the effectiveness of their teaching of mental health knowledge and skills, whereas family practice and primary care internal medicine reported the use of some evaluation method in 100 percent and 92 percent of their programs, respectively (chi-square = 16.3, $p = .0003$). Family practice was more likely to report formal evaluation methods than either of the other specialties (chi-square = 12, $p = .0027$). The specialties also differed significantly on whether the instructor used standardized evaluation forms (chi-square = 19.4, $p = .0001$), informal oral questioning (chi-square = 18.2, $p = .0001$), formal written examination (chi-square = 7.6, $p = .02$), and formal chart review (chi-square = 16.5, $p = .0003$) to ascertain the residents' knowledge and understanding of psychosocial content. Overall, family practice programs consistently used each evaluation method more often than either of the other two types of programs.

Thirty-five percent of the funds for mental health training in traditional internal medicine programs was paid exclusively by the hospital's department of psychiatry, in contrast to 15.5 percent of primary care internal medicine and 6.3 percent of family practice programs, respectively, as shown in Table 4. Primary care internal medicine programs had significantly greater support from the Health Resources and Services Administration (HRSA) than family practice or traditional internal medicine ($p = .01$). Primary care internal medicine and traditional internal medicine programs had more grant support from the National

TABLE 4

Percentage of Funds from Five Sources for Salaries for Mental Health Teachers in 67 Family Practice, 42 Primary Care Internal Medicine, and 38 Traditional Internal Medicine Residency Programs, 1984

Sources of Funds	Residency Programs*		
	Family Practice	Primary Care Internal Medicine	Traditional Internal Medicine
Fees for service	16.0	12.0	18.0
Grants	18.0	63.0	23.0
Primary care department†	51.0	5.8	11.0
Psychiatry or mental health division	6.3	15.5	35.0
Other‡	8.7	2.7	13.0

* Differences among the three types of programs were significant (p = .01) for all sources except fees for service.

† Other than "psychiatry or mental health division" and "other."

‡ For example, private foundations and medical schools.

Institutes of Health than family practice (p = .01). Mean salary costs per year for all mental health teachers in the programs were: family practice, $66,296; primary care internal medicine, $48,058; and traditional internal medicine, $44,807. Mean costs per program for each resident per year were: family practice, $4,014; primary care internal medicine, $2,289; and traditional internal medicine, $1,120.

The mean numbers of residents were significantly different in family practice, primary care internal medicine, and traditional internal medicine programs: 22, 21, and 40, respectively (p = .001). The three specialties were also significantly different with regard to the mean number of foreign medical graduates (7, 1, and 5, respectively [p = .003]) and the mean number who were members of racial or ethnic minorities (2, 2, and 7, respectively [p = .007]).

Discriminant function analyses showed that the following variables were significant in discriminating among the three specialties: percentage of salaries paid by grants funds; percentage of life cycle issues taught; and percentages of training done by psychiatrists, nurses, and psychiatry residents. Data on these five variables alone were sufficient to predict correctly the specialty of 84 percent of the programs.

Discussion

The present study demonstrated that important differences exist among the three specialties in teaching mental health issues to residents. The response rate of each specialty to the questionnaire, which was significantly lower for traditional internal medicine than the others, may reflect the interest each discipline has in mental health issues. Very few traditional internal medicine programs used block rotations in psychiatry or mental health, and relatively little formal instruction was given in mental health in traditional internal medicine residencies.

Of note is the heavy emphasis in traditional internal medicine programs on teaching by consultation in inpatient facilities. Since such consultation is an approach that relies on the case at hand, a proper distribution of training cases is not assured. Furthermore, use of the consultant to provide most of the care does not ensure that interviewing, diagnosis, and management are taught to the resident.

On average, a resident in traditional internal medicine requested three consultations with a psychiatrist per year and spent an average of less than 15 minutes with the consultant on each case. In sum, the consultation experience is largely shaped by the motivation of the traditional internal medicine resident to request it and thus leaves much room for variability in the residents' learning. Often the only learning is that which the resident gains from reading the consultation notes, which can be highly variable in quality.

Traditional internal medicine training in mental health was strongly affiliated with departments of psychiatry, which not only paid for a substantial amount of the training but also coordinated and administered the teaching. Primary care internal medicine programs were similar to traditional internal medicine programs in that they were less likely to fund their own mental health teachers, whereas family practice programs provided the bulk of the salary support for these teachers.

With regard to content and skills taught, mental health teachers in traditional internal medicine were much more likely than the others to emphasize organic brain syndrome, substance abuse, and psychophysiologic reactions. By contrast, teachers in family practice emphasized life cycle issues such as grief reactions, marital problems, and occupational stress. Primary care internal medicine occupied an intermediate position on this issue. Traditional internal medicine programs placed less emphasis than the others on teaching psychosocial awareness, interviewing (especially with regard to family and family systems), and complex psychosocial management techniques but gave a prominent place to simple pharmacotherapy. However, since the total hours used for all teaching varied among specialties, the percentage of that teaching time devoted to mental health must be translated into total hours in order to know the amount of mental health training provided to a resident. For example, family practice and primary care internal medicine programs, on average, provided five times more time in formal training in mental health than traditional internal medicine.

Finally, whereas almost all of primary care internal medicine and family practice programs made some attempt to evaluate the effects of their mental health training programs, a majority of the traditional internal medicine programs reported no specific evaluation component and tended to use informal assessments. This lack of evaluation was consistent with the lack of formal teaching and specific educational goals and objectives in those programs.

Psychiatrists were used to teach less than 20 percent and 40 percent of the mental health knowledge and skills in family practice and primary care internal medicine, respectively. A combination of psychologists, social workers, and primary care physicians provided a majority of mental health training in these two types of residencies. The authors consider that in some residency programs psychosocially oriented attitudes, knowledge, and skills have become familiar enough to the primary care faculty members that they may be able to teach the material pertaining to mental health. However, this assimilation of knowledge by primary care physicians and its effect on the teaching of mental health has not been sufficiently studied or described in the literature.

The finding that programs in family practice and primary care internal medicine use psychiatrists much less often than the traditional internal medicine programs may account for the finding that the former specialties place less emphasis than traditional internal medicine on organic mental syndrome and depression and more on sociocultural and life cycle issues and on awareness of psychosocial issues. Since delirium and depressive and anxiety disorders are among the common psychiatric dysfunctions encountered in the primary care setting and often require somatic as well as psychological interventions, the role of the psychiatrist as teacher in primary care residencies should be reconsidered (13).

Although mental health programs taught by members of a variety of disciplines are commonplace in the undergraduate years, the nature of mental health training for primary care residents and the disciplines of the teachers are even more varied than the undergraduate programs. For the past several years, the National Institute of Mental Health has funded training programs to teach mental health skills and knowledge to primary care residents. In addition, the HRSA, which has sponsored training programs in family medicine since 1975, not only requires a mental health training component but also provides funds for behavioral science faculty members, program coordinators, and/or evaluators. The HRSA has encouraged the programs to use educational methods such as stated teaching goals and evaluation tools.

The role of the psychiatrist as teacher in the traditional internal medicine program and the more recently developed specialties of primary care internal medicine and family practice has not been defined. In fact, Engel (14) questioned the role of the psychiatrist as teacher for the typical medical-surgical specialist and felt that the specialists themselves, after advanced psychological training, were the most appropriate teachers of psychosocial issues.

The present study indicates the need for specialists from several different disciplines to teach mental health topics to primary care residents. Because residency program directors deem it important that trainees gain broad knowledge and skills in mental health, curricula and teaching programs need to be developed that are taught by specialists from a variety of disciplines. Prospective studies that examine the knowledge and skills that trainees accrue from different approaches to teaching mental health issues would assist directors of primary care training programs in assessing the value of the psychiatrist as teacher and in ascertaining which disciplines demonstrate the expertise to teach specific mental health content.

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Comparing the Number of Journals Available for Publication Of Papers by Faculty Members in the Clinical Specialties

Howard K. Rabinowitz, M.D.

The mission of U.S. medical schools is based on the classic triad of research, teaching, and patient care. Recent economic changes, however, have forced clinical medical faculties to generate additional funds through patient care activities at the expense of research and teaching (1). At the same time, financial concern has also caused medical schools to reevaluate their policies of promotion and tenure (2, 3).

While a number of important issues have been identified with regard to the area of promotion (for example, teaching, patient care, and administration), scholarly activity in the form of papers accepted by peer review for publication in a scholarly journal is a primary requirement that exists in every medical school (4). Despite the fact that the different clinical departments have varying requirements and unique needs, promotion guidelines tend to have minimum criteria that apply across the board in all specialties. In this paper, the author addresses the issue of whether equivalent opportunities for publication are available to medical school faculty members in the different clinical specialties.

Methods

The number of full-time budgeted faculty positions (filled and vacant) and the number of senior faculty members (associate professor and professor) in U.S. medical schools (1984–85) were determined for each of the 16 clinical departments from data published by the American Medical Association (5). Professional journals listed in *Index Medicus* (1985) were then classified according to similar clinical departments on the basis of their title or listing in the subject index. Subspecialty journals were included with their clinical specialty departments (for example, cardiology with medicine, child psychiatry with psychiatry, and neurosurgery with surgery). Those journals utilized in large degree by faculty members in multiple specialties (for example, *Journal of the American Medical Association* and *Journal of Medical Education*) or not clearly clinically oriented (for example, *Microbiology* and *Pharmacology*) were not included. For comparison purposes, the ratio of faculty positions per journal was calculated by dividing the total number of faculty members by the number of journals in their respective specialty department. In addition, the relationship between the ratio of journals per faculty member (number of journals divided by the number of faculty members) and the percent of senior faculty members (number of associate professors and professors divided by the number of total faculty) was determined by use of a linear regression.

Results

The number of full-time budgeted faculty positions for each clinical department, the number and percent of senior faculty members (professor and associate professor), the number of professional journals in their respective departments, and the ratio of the number of faculty positions to the number of journals are shown in Table 1. Of the 16 clinical specialties, 14 (88 percent) had a faculty-journal ratio in the range of 12 to 60. Anesthesiology had a higher ratio of 118.4 positions per journal, while the ratio in family medicine was 500 faculty positions per journal, eight to 40 times greater than the other specialties. There was a positive correlation between the number of journals per faculty position and the percent of senior faculty members ($r = 0.65$), although the degree of this relationship might be some-

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TABLE 1

Full-Time Budgeted (Filled and Vacant) Faculty Positions and Number and Percent of Senior Faculty Positions in U.S. Medical Schools (1984–85), Number of Journals Listed in *Index Medicus* by Specialty (1985), and Ratio of Faculty Positions per Journal

Clinical Departments	Full-Time Positions	Senior Faculty Members		No. of Journals	Ratio of Positions Per Journal
		No.	Percent		
Anesthesiology	2,724	865	32	23	118.4
Dermatology	439	231	53	31	14.1
Family medicine	1,999	713	36	4	500.0
Medicine	12,700	5,976	47	875	14.5
Neurology	1,795	859	48	145	12.4
Obstetrics/gynecology	2,425	1,107	46	117	20.7
Ophthalmology	1,075	538	50	53	20.3
Orthopedics	793	383	48	34	23.3
Otolaryngology	641	315	49	38	16.9
Pediatrics	5,564	2,572	46	94	59.2
Physical medicine	658	212	32	18	36.6
Psychiatry	5,586	2,404	43	118	47.3
Public health and preventive medicine	1,057	523	49	88	12.0
Radiology	4,133	1,872	45	81	51.0
Surgery	4,738	2,530	53	143	33.1
Urology	350	214	61	23	15.2
Total/Mean	47,559	21,314	46	1,885	25.2

what overestimated because the denominators in both factors are the same.

For the two clinical departments that had few journals (faculty-journal ratio > 100), only 33.4 percent of their faculty members were at the professor or associate professor level, while for the six departments with a large number of journals (faculty-journal ratio < 20), 47.8 percent of the faculty members were at the senior faculty level. In addition, of the nine clinical specialties that were overrepresented with regard to journals (less than the mean faculty-journal ratio of 25.2), the percentage of senior faculty members in all nine departments were equal to or greater than the mean percentage of senior faculty members for all 16 departments. Likewise, of those seven specialties that were underrepresented with journals, the percentage of senior faculty members in six departments (all except surgery) was equal to or less than the mean percentage.

Discussion

Although publication requirements for medical school faculty members for promotion purposes vary by institution, they remain an important factor in each school. The data presented in this paper indicate that variation exists regarding the number of journals available for publication among faculty members from different clinical departments. In addition, there was a positive relationship between the number of medical journals available for publication within a specialty and the percent of senior faculty members within each corresponding clinical department.

While this paper has used *Index Medicus* to determine the number of journals available in each discipline, *Index Medicus* represents only a portion of the medical literature and includes some nonrefereed journals while excluding some refereed journals. In addition, the categorization of journals by specialty is, to some extent, arbitrary, since some specialty journals are available for faculty members in more than one specialty. These limitations, however, apply across all disciplines.

A number of possible explanations exist for the data obtained in this study. The number of journals might accurately reflect the amount of scholarly activity within each discipline. In the case of family medicine, it is possible that the small number of journals reflects the relative youth of the specialty or the broad nature of the discipline, in which scholarly activity might be reported in the internal medicine or pediatric literature. On the other hand, it is possible that some disciplines (for example, those with ratios of 12 to 15 faculty members for each journal) may have a greater forum available for publication than those disciplines with a greater faculty-journal ratio. Questions then arise as to how much competition is necessary to maintain quality. That is, when a large number of journals are available in one area, is the quality of published material maintained?

The fact that some specialties have a larger forum for publication and a higher percentage of senior faculty members than others leads to questions concerning the use of published papers for promotion purposes. This complex and sensitive issue requires further study.

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Teaching Clinical Reasoning in a Clinical Clerkship By Use of Case Assessments

Martha G. Regan-Smith, M.D.

Problem-oriented learning is an efficient method for students to develop knowledge, reasoning skills, and study skills simultaneously (1, 2). Further, problem-based learning provides a mechanism by which basic science material can be applied to clinical patient problems and that promotes improved retention, better understanding, and sounder clinical skills (3). Therefore, because the educational objective of clinical clerkships is to teach the student how to integrate basic science information with the clinical skills and competencies necessary to diagnose, treat, and care for patients (4), problem-based learning is well suited to clerkship teaching.

Usually, clerkship students work up cases already diagnosed before admission or work up cases along with ward team members, who as a group diagnose the patient problem. Independent thought on the student's part is not required or evaluated, and students often reflect what the attending physician and/or house staff members say and think. The student can merely read about the diseases and drugs involved and recite the information to the attending physician in order to appear bright and knowledgeable on teaching rounds. In order to determine whether a student can assess a patient problem independently, a mechanism is needed to provide an opportunity to solve problems and think critically through real patient cases with unknown diagnoses (5). Small group sessions during which students use other students' cases as unknown case problems force the students to think and to solve clinical patient problems. At the same

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Medical Education in People's Republic of China

John A. D. Cooper, M.D., Ph.D., and Lin Yingang

Abstract—The three types of physicians being educated in the People's Republic of China—practitioners in traditional Chinese medicine, traditional Mongolian medicine, and western-type medicine—and the nation's medical schools are discussed. The country officially recognizes 117 health professions educational institutions—23 colleges of traditional Chinese medicine, 91 western-type medical schools, two schools of pharmacy, and one institution that trains pharmacy, medical, and hygienic inspectors. Eight of the 91 western-type schools, in addition to providing training in western-type medicine, also offer education in traditional Chinese medicine. Training in Mongolian medicine is offered by one of these eight western schools and by one other western school. No schools offer only Mongolian medicine education.

Three types of physicians are being educated in the People's Republic of China: practitioners of traditional Chinese medicine (zhongyi), traditional Mongolian medicine, and western-type medicine (xiyi).

Traditional Medical Schools

Traditional Chinese medicine goes back almost 50 centuries. It is based on the concepts of yin and yang, pairs of fluidly interacting opposites, and qi, or vital energy. These two concepts are related in Chinese medicine, which defines the harmonious and timely exchange of qi as constituting health. Five yin systems store the various forms of this vital energy in the body, and six yang systems assimilate and transfer it from place to place (1).

The aim of the traditional Chinese physician is to maintain this dynamic balance in the patient and to restore it when it has been disturbed. In assessing the patient's condition, Chinese medical practice makes use of a fourfold method of diagnostic observation (1). This includes: visual examination; listening to the patient's breathing and any other sounds; odors of breath, body, and excretions; medical history and present complaint; and touch, including the nature of the pulse. The principal therapeutic methods used to establish internal harmony in the patient are "the administration of drugs or herbs or through manipulation at the surface of the body [including acupuncture and moxibustion]" (1).

The 23 colleges of traditional Chinese medicine train physicians and pharmacists. Table 3 (appearing at the end of this article) shows the relationship between these institutions and governmental agencies; gives the total number of faculty members, professors, and associate professors; and lists the specialties that are

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taught. (All of the 23 colleges have "traditional Chinese medicine" in their titles.)

With the encouragement of the Ministry of Public Health, some western-type Chinese medical schools also train their students in traditional medicine techniques. More than 130,000 graduates in western medicine have studied traditional Chinese medicine, and 2,230 have received the title of physician-in-charge that designates those who use both techniques (2). Eight western-type medical schools also graduate students in traditional Chinese medicine and two in traditional Mongolian medicine.

Prior to the Liberation in 1949, there was great variation in the training of traditional practitioners. In 1955 the qualifications for these practitioners were formally defined, and their education and training are now carried out in medical colleges of traditional medicine (3).

The total number of students and the numbers who were admitted and graduated in the 1985–86 academic year in traditional Chinese medical schools are given in Table 1. Students enter from high school for a course of study lasting five or six years. The traditional method of teaching by preceptors was retained as far as possible in the medical school programs.

Of the 23 traditional Chinese medical schools, two are supported by the Ministry of Public Health, seven by the health bureau of a province, five by the higher education bureau of a province, one by the higher education bureau of a city, six by the educational bureau of a province, one by the educational bureau of a city, and one by the health bureau of an autonomous region.*

A total of 336,200 doctors were practicing traditional Chinese medicine in 1985,* up from 258,000 in 1979 (4). In the past the practice was largely by indigenous doctors; but beginning in 1956 it became a part of regular hospital care,* and by 1985 there were 1,455 hospitals or outpatient departments and most general hospitals had incorporated traditional medicine into their system of care. There were 102,390 traditional Chinese medicine hospital beds out of a total of about 2,487,000 beds in the country.*

TABLE 1

Total Enrollment and Number of Students Admitted and Graduating, People's Republic of China Medical Schools, 1985–86

Type of Progam	Total Enrolled	Admitted	Graduated
Traditional Chinese medicine	19,552	3,871	3,945
Western-type medicine	90,533	21,520	18,348
Traditional Mongolian medicine	518	200	84

Source: Ministry of Public Health, People's Republic of China.

Western-Type and Other Schools

Western-type medicine was introduced into China early in the 19th century through a dispensary established by British missionaries on Macao Island and the Canton Ophthalmic Hospital established by Peter Parker, an American medical missionary (5). Formal medical schools were established by missionaries from Europe and the United States during the 19th and early 20th centuries.

Ninety-one civilian western-type medical schools were in operation in 1986. As mentioned earlier, eight of these schools also graduate traditional Chinese medical physicians and two graduate traditional Mongolian medical physicians. All 91 schools are under the direction of and supported by a variety of governmental agencies: the Ministry of Health (11 schools); the health bureau of a province (22) or a city (2); the higher education bureau of a province (16); the health bureau of an autonomous region (1); the higher education bureau of a city (1); the educational bureau of a province (19), city (1), or an autonomous region (8); the State Nationalities Affairs Commission (1); the Office of Overseas Chinese Affairs of the State Council (1); the National Non-ferrous Metal Industrial Corporation (1); and the ministries of railways (2), coal (1), metallurgical industry (1), communication (1), nuclear industry (1) and agriculture, animal husbandry, and fisheries (1).

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* *Data provided by the Ministry of Public Health of the People's Republic of China.*

The medical schools of ministries and agencies other than those related to health or education train physicians and other health professionals for their own programs. The School of Medical Inspection of Hubei Province, which trains pharmacy, medical, and hygienic inspectors, is under the health bureau of the province. The two independent pharmacy schools are under the Medicinal Administration Bureau. Thus, the People's Republic of China officially recognized 117 health professions educational institutions (Table 3).

One pharmacy school was established in 1936 and the other in 1948. Instead of creating additional pharmacy schools to meet increased needs, both western-type and traditional Chinese medical schools undertook the training of pharmacists.

In addition to the civilian institutions, four military medical schools (not shown in Table 3) under the Ministry of Defense prepare physicians for the armed forces.

Fourteen of the 91 civilian western-type medical schools were designated medical universities in 1985. Of the nine under the Ministry of Public Health, four (Zhongshan Medical University in Guangzhou, Shanghai Medical University, Beijing Medical University, and the West China Medical University) have been identified as "key" institutions and receive special funding from the ministry.

TABLE 2

Founding Dates of Medical Schools in the People's Republic of China

Date	Western-Type Medical Schools*	Traditional Chinese Medical Schools
≤1940	14	
1941–1950	12	
1951–1960	46	19
1961–1970	3	1
1971–1980	12	2
1981–1986	4	1

* Training in traditional Mongolian medicine is also offered by two western-type medicine schools. No schools offer only training and education in Mongolian medicine.

Source: Ministry of Public Health, People's Republic of China.

The oldest of the Chinese medical schools is the Zhongshan Medical University in Guangzhou (Canton). Fourteen western-type medical schools were established before 1940. Forty-six were opened in the decade of the 1950s at about the time of the Great Leap Forward when the government gave great attention to health issues. During this same decade the first 19 traditional Chinese medical schools were developed (Table 2).

The number of students enrolled and graduating from western-type medical schools in 1985–86 is given in Table 1. Students enter western-type medical schools on graduation from high school at about age 18. They usually apply to schools near their home, but some students do come from other towns. They are selected for admission largely on the basis of a national examination administered under the supervision of the Ministry of Education. Although applicants come from the upper part of their graduating class, medicine does not have the prestige that it has in the United States, and the best students go into engineering because of the opportunities made available by efforts to strengthen and modernize the nation's industry. However, from observations made by the first author, the medical students are bright and energetic and appear to be deeply dedicated to a career of service to their country.

Medical students are required to live in dormitories provided by the college. There is no charge for tuition or rent, but the students are required to pay for their board (the equivalent of about $12 a month) and for some books. Although these costs seem low, they are a substantial sum in relationship to income in China. Scholarships are available for students who need financial assistance.

The curriculum of most western-type schools is five years in length and is based on the European system. During the first year, students take physics, chemistry, biology, higher mathematics, human anatomy, histology and embryology, and some social sciences. They begin a foreign language (usually English) and political philosophy courses that continue into the third year. In the second year, they have physiology, biochemistry, parasitology and pathology. In the third year, they take pathophysiology, microbiology, pharmacology, laboratory diagnosis, physical diagnosis, radiology, some traditional Chinese medicine, and public health.

During the fourth year, students have lectures in the clinical disciplines. In the fifth year, they are assigned to clinical clerkships, mainly in medicine, surgery, obstetrics/gynecology, and pediatrics. Some schools have a sixth year consisting of a rotating internship with 12-week assignments in the major clinical disciplines. Part of the time is spent in clinics and small hospitals in the city or country.

The Peking Union Medical College (PUMC), a special institution of excellent quality with an outstanding faculty, was opened in 1917 with the support of the Rockefeller Foundation and the China Medical Board. It is closely related to the Chinese Academy of Medical Sciences, whose programs are very similar to those of the National Institutes of Health in the United States. PUMC is largely devoted to the development of highly trained scientific personnel, and there is great competition by applicants from all parts of the country for a place in its small entering class of about 30 students. The medical school course is eight years in length. Two and a half years are spent in premedical education at the Beijing University, and the medical school segment of preclinical and clinical courses takes five and a half years. Throughout the curriculum, basic training in research is emphasized.

Although all of the medical schools are under the general supervision of the Ministry of Public Health, in recent years each institution has been given considerable latitude in designing its course of study. A standardized curriculum does not exist.

Postgraduate Pathways

On graduation from western-type medical schools, students receive a bachelor of medical sciences degree. On the basis of plans from the Ministry of Public Health and the students' performances in medical school and grades on an examination, they follow one of three paths. The faculty is permitted to select about 20 percent of the graduates for further training at the medical school.

One pathway is a three-year program that includes additional courses and a research project under a basic science or clinical faculty member leading to a master of medical sciences degree. During the training period, students in this program serve as teaching assistants for medical student courses. Those with the master's degree may enter a residency program if they want to become a faculty member in a clinical discipline or continue their graduate work for a doctor of medical science degree.

All advanced degrees beyond the bachelor's are under the control of the Academic Degree Commission of the State Council, although for those in the medical sciences approval is usually *pro forma*. The State Council has not agreed to requests from medical colleges to give the Ph.D. or the M.D. degrees.

A second pathway is three years of residency training leading to qualifications as a specialist. The third pathway is for those graduates not chosen for further training. They are assigned by the Ministry of Labor and Personnel to clinics or small hospitals in the country, usually at a remote site.

Students work very hard to get into the 20 percent chosen for additional training. However, even if they are successful, they do not have complete freedom in making a career choice. They may have to select a program or a specialty of medicine that is not their first preference.

After completing advanced training, graduates are given appointments as lecturers. Those in the clinical disciplines become members of the staff of one of the teaching hospitals. If they are good enough, they may move through the ranks to become professors. Almost all of the graduates remain at the medical center in which they were educated and trained. Few of them move to another institution, in part because they usually grew up in the area and have close family ties and in part because of difficulties in finding accommodations in another city without relatives there.

The facilities in the four western-type medical universities and their teaching hospitals visited by the first author in 1985, although not elegant, are adequate for good educational programs. Student laboratories have modern equipment. The libraries provide resources for medical students and investigators, and some have links to the National Library of Medicine of the National Institutes of Health. The faculties have modest laboratories and equipment to carry out their research. However, as in most developing countries, problems are experienced with maintenance and repair of the equipment.

In 1985 China had 602,200 senior and 472,000 middle-level western-type physicians, about 970 people per physician, according to Ministry of Public Health data.

Conclusion

Medical education and medical care in China have made a remarkable recovery from the devastating effects of the Cultural Revolution. The high priorities being given to extending and improving medical care through the strengthening and expansion of medical education and biomedical research by Minister of Public Health Cui Yueli give much promise for continuing the development of resources and programs. Unless there are changes in the present direction, medicine in China will achieve equal footing with that in western countries.

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TABLE 3

Medical Schools, People's Republic of China, 1985–86

Province/School	Year Started	Responsible Agency	Teaching Staff			Medical Students			Graduate Students	Programs
			Total	Prof.	Assoc. Prof.	Admitted	Graduated	Total Enrolled		
Anhui										
Anhui College of Traditional Chinese Medicine, Hefei	1958	Health Bureau of Province	282	2	15	100	209	646	13	Traditional Chinese medicine and pharmacy, acupuncture and massage, pharmacy
Anhui Medical College, Hefei	1949	Health Bureau of Province	401	13	49	310	292	1,435	61	Medicine, stomatology, public health, health management
Bengbu Medical College, Bengbu	1958	Health Bureau of Province	259	6	18	276	341	1,264	17	Medicine, medical inspection, nursing
Wannan Medical College, Wuhu	1958	Health Bureau of Province	219	1	18	255	202	1,056	25	Medicine
Beijing										
Beijing College of Traditional Chinese Medicine, Beijing	1956	Ministry of Health	315	4	41	121	117	600	134	Traditional Chinese medicine and pharmacy, acupuncture and massage, nursing
Beijing Medical University, Beijing	1912	Ministry of Health	763	46	174	220	—	1,169	563	Medicine, preclinical medicine, stomatology, public health, pharmacy, pharmaceutical chemistry, chemistry, nursing, experimental technology
Capital Medical College, Beijing	1960	Health Bureau of City	301	3	29	261	139	1,108	144	Medicine, pediatrics, stomatology
Peking Union Medical College, Beijing	1917	Ministry of Health	105	5	27	30	—	209	576	Medicine, nursing, experimental technology
Fujian										
Fujian College of Traditional Chinese Medicine, Fuzhou	1958	Higher Education Bureau of Province	230	5	10	152	150	674	6	Traditional Chinese medicine and pharmacy, acupuncture and massage, traditional Chinese orthopedics

TABLE 3—*Continued*

Province/School	Year Started	Responsible Agency	Teaching Staff			Medical Students			Graduate Students	Programs
			Total	Prof.	Assoc. Prof.	Admitted	Graduated	Total Enrolled		
Fujian Medical College, Fuzhou	1937	Higher Education Bureau of Province	365	8	22	404	316	1,783	42	Medicine, stomatology, public health, medical inspection
Gansu										
Gansu College of Traditional Chinese Medicine, Lanzhou	1978	Health Bureau of Province	123	2	1	104	112	513	—	Traditional Chinese medicine and pharmacy, acupuncture
Lanzhou Medical College, Lanzhou	1933	Health Bureau of Province	433	6	83	256	303	1,379	74	Medicine, stomatology, public health, pharmacy
The Department of Medicine of North-West College of Nationalities, Lanzhou	1958	State Nationalities Affairs Commission	44	—	—	36	30	137	—	Medicine
Guangdong										
Guangdong College of Medicine and Pharmacy, Guangzhou	1978	Higher Education Bureau of Province	299	1	17	100	29	264	—	Medicine, public health, pharmacy
Guangzhou College of Traditional Chinese Medicine, Guangzhou	1956	Ministry of Health	467	8	42	200	242	1,002	81	Traditional Chinese medicine and pharmacy, acupuncture
Guangzhou Medical College, Guangzhou	1958	Higher Education Bureau of Province	343	3	26	342	198	1,306	—	Medicine, radiology
Medical College of Jinan University, Guangzhou	1978	Office of Overseas Chinese Affairs of State Council	216	12	56	118	50	564	80	Medicine, stomatology
Medical College of Shantou University, Shantou	1958	Higher Education Bureau of Province	238	1	14	111	102	377	—	Medicine
Medical Department of Hainan University, Haikou	1952	Higher Education Bureau of Province	201	—	8	151	149	495	—	Medicine

Zhanjiang Medical College, Zhanjiang	1958	Higher Education Bureau of Province	237	3	20	243	199	1,121	7	Medicine, experimental technology
Zhongshan Medical University, Guangzhou	1866	Ministry of Health	688	37	131	349	—	2,062	389	Medicine, stomatology, forensic medicine, radiomedicine, anesthesiology, public health, nursing, clinical nutrition
Guangxi										
Guangxi College of Traditional Chinese Medicine, Nanning	1956	Education Bureau of Autonomous Region	299	3	8	95	98	737	6	Traditional Chinese medicine and pharmacy, acupuncture
Guangxi Medical College, Nanning	1934	Education Bureau of Autonomous Region	444	18	51	334	312	1,492	101	Medicine, stomatology, public health
Guangxi Youjiang Medical College of Nationalities, Baise	1958	Education Bureau of Autonomous Region	135	—	4	206	97	608	—	Medicine
Guilin School of Medicine, Guilin	1958	Education Bureau of Autonomous Region	149	—	—	153	97	361	—	Medicine
Guizhou										
Guiyang College of Traditional Chinese Medicine, Guiyang	1965	Education Bureau of Province	294	2	25	160	202	798	19	Traditional Chinese medicine and pharmacy, traditional Chinese orthopedics, acupuncture
Guiyang Medical College, Guiyang	1938	Education Bureau of Province	383	10	44	199	242	1,119	35	Medicine, pharmacy, public health
Zunyi Medical College, Zunyi	1949	Education Bureau of Province	320	—	12	160	226	714	16	Medicine, stomatology

TABLE 3—*Continued*

Province/School	Year Started	Responsible Agency	Teaching Staff			Medical Students			Graduate Students	Programs
			Total	Prof.	Assoc. Prof.	Admitted	Graduated	Total Enrolled		
Hebei										
Chengde Medical College, Chengde	1949	Education Bureau of Province	183	—	11	264* 41†	225* 41†	789* 123†	—	Medicine, traditional Chinese medicine, nursing
Hebei College of Traditional Chinese Medicine	1982	Education Bureau of Province	181	1	17	150	148	622	—	Traditional Chinese medicine
Hebei Medical College, Shijiazhuang	1970	Education Bureau of Province	578	16	138	404	370	1,968	86	Medicine, stomatology, pharmacy, public health
Huabei Medical College for the Coal Industry, Tangshan	1958	Ministry of Coal Industry	280	2	23	239	120	878	6	Medicine, public health
Zhangjiakou Medical College, Zhangjiakou	1949	Education Bureau of Province	183	—	11	211* 51†	200* 51†	690* 173†	—	Medicine, traditional Chinese medicine, medical inspection
Heilongjiang										
Harbin Medical University, Harbin	1949	Higher Education Bureau of Province	525	20	134	576	312	1,775	260	Medicine, stomatology, public health, biomedical engineering
Heilongjiang College of Traditional Chinese Medicine, Harbin	1959	Higher Education Bureau of Province	304	3	29	128	201	786	90	Traditional Chinese medicine and pharmacy, traditional Chinese orthopedics, acupuncture
Jiamusi Medical College, Jiamusi	1958	Higher Education Bureau of Province	238	2	27	178	146	892	35	Medicine, stomatology, pharmacy, pharmaceutics
Mudanjiang School of Medicine, Mudanjiang	1958	Health Bureau of Province	100	—	5	128	105	514	—	Medicine, radiology, anesthesiology
Qiqihar School of Medicine, Qiqihar	1978	Health Bureau of Province	100	—	9	117	107	326	—	Medicine, maternal and child hygiene, neurology, psychiatry

Henan									
Henan College of Traditional Chinese Medicine, Zhengzhou	1958	Education Bureau of Province	334	—	9	264	247	1,312	23	Traditional Chinese medicine and pharmacy, acupuncture
Henan Medical University, Zhengzhou	1953	Education Bureau of Province	505	17	94	359	421	2,013	141	Medicine, stomatology, pediatrics, public health
Kaifeng School of Medicine, Kaifeng	1958	Education Bureau of Province	187	—	2	223	219	642	—	Medicine, pharmacy
Luoyang School of Medicine, Luoyang	1958	Education Bureau of Province	178	—	—	340	353	1,010	—	Medicine, forensic medicine
Xinxiang Medical College, Jixian	1958	Education Bureau of Province	224	—	14	322	363	935	—	Medicine, pediatrics
Hubei									
Enshi School of Medicine, Enshi	1958	Education Bureau of Province	123	—	8	120* 40†	102* —	285* 80†	—	Medicine, traditional Chinese medicine
Hubei College of Traditional Chinese Medicine, Wuhan	1958	Education Bureau of Province	304	3	10	171	160	946	37	Traditional Chinese medicine and pharmacy, acupuncture
Hubei Medical College, Wuhan	1943	Education Bureau of Province	431	21	77	320	219	1,245	165	Medicine, stomatology, pediatrics, family planning management
School of Medical Inspection of Hubei Province, Wuhan	1984	Health Bureau of Province	58	—	1	—	—	—	—	Pharmacy, medical inspection, hygienic inspection
Tongji Medical University, Wuhan	1951	Ministry of Health	741	67	148	208	309	1,196	499	Medicine, pediatrics, forensic medicine, public health, environmental medicine, pharmacy, maternal and child hygiene, radiology
Wuhan School of Medicine for the Metallurgical Industry, Wuhan	1965	Ministry of Metallurgical Industry	160	—	4	172	102	544	—	Medicine, public health
Yichang School of Medicine, Yichang	1958	Education Bureau of Province	152	—	14	164* 49†	87* 29†	450* 92†	— —	Medicine, traditional Chinese medicine, maternal and child hygiene, radiology

TABLE 3—*Continued*

Province/School	Year Started	Responsible Agency	Teaching Staff			Medical Students			Graduate Students	Programs
			Total	Prof.	Assoc. Prof.	Admitted	Graduated	Total Enrolled		
Hunan										
Hengyang Medical College, Hengyang	1958	Education Bureau of Province	326	1	17	280	276	1,446	—	Medicine, ophthalmology, E.N.T.
Hunan College of Traditional Chinese Medicine, Changsha	1960	Education Bureau of Province	317	2	16	168	206	1,008	76	Traditional Chinese medicine and pharmacy, acupuncture
Hunan Medical College, Changsha	1914	Ministry of Health	622	34	105	402	364	1,743	300	Medicine, public health, medical inspection
Inner Mongolia Autonomous Region										
Baotou Medical College, Baotou	1958	Education Bureau of Autonomous Region	275	—	11	115	126	375	—	Medicine, public health
Inner Mongolia Medical College, Huhhot	1956	Education Bureau of Autonomous Region	508	14	47	242* 43† 120‡	239* 43† 43‡	1,253* 214† 196‡	30	Medicine, pharmacy, traditional Chinese medicine, Mongolian medicine
Inner Mongolia Medical College of Nationalities, Tongliao	1978	Education Bureau of Autonomous Region	171	1	3	135* 80‡	86* 41‡	342* 322‡	—	Medicine, Mongolian medicine
Jiangsu										
Nanjing College of Traditional Chinese Medicine, Nanjing	1958	Higher Education Bureau of Province	306	—	13	229	122	832	98	Traditional Chinese medicine and pharmacy, acupuncture and massage
Nanjing Medical College, Nanjing	1970	Higher Education Bureau of Province	560	17	93	352	191	1,306	182	Medicine, stomatology, pediatrics, nursing, public health

Nanjing Pharmacy College, Nanjing	1936	Medicinal Administration Bureau	273	2	12	—	—	—	93	Pharmacy, pharmacology, chemical pharmaceutics, biochemical pharmaceutics, traditional Chinese pharmacy
Nanjing Railway Medical College, Nanjing	1958	Ministry of Railways	371	6	35	250	301	1,211	52	Medicine, public health
Nantong Medical College, Nantong	1958	Ministry of Communication	270	—	40	265	210	1,152	56	Medicine, seafaring medicine
Suzhou Medical College, Suzhou	1957	Ministry of Nuclear Industry	515	9	67	262	237	1,119	79	Medicine, radio-medicine
Xuzhou Medical College, Xuzhou	1958	Higher Education Bureau of Province	225	3	20	302	155	1,270	5	Medicine
Yangzhou Medical College, Yangzhou	1979	Higher Education Bureau of Province	187	—	6	162	—	597	—	Medicine, uterology, traditional Chinese medicine
Zhenjiang Medical College, Zhenjiang	1980	Higher Education Bureau of Province	177	1	11	154	—	611	—	Medicine, medical inspection
Jiangxi										
Gannan School of Medicine, Ganzhou	1958	Health Bureau of Province	149	1	15	208	204	636	—	Medicine, maternal hygiene
Jiangxi College of Traditional Chinese Medicine, Nanchang	1958	Health Bureau of Province	313	3	24	180	184	854	8	Traditional Chinese medicine and pharmacy, pharmacy
Jiangxi Medical College, Nanchang	1952	Health Bureau of Province	542	13	94	380	535	2,333	52	Medicine, stomatology, pediatrics, public health
Jilin										
Bethune Medical University, Changchun	1938	Ministry of Health	568	23	202	279	407	1,589	316	Medicine, stomatology, pediatrics, radio-medicine, public health, medical library science, environmental medicine, nutrition and food hygienic inspection

TABLE 3—*Continued*

Province/School	Year Started	Responsible Agency	Teaching Staff			Medical Students			Graduate Students	Programs
			Total	Prof.	Assoc. Prof.	Admitted	Graduated	Total Enrolled		
Changchun College of Traditional Chinese Medicine, Changchun	1958	Health Bureau of Province	192	1	10	125	42	595	14	Traditional Chinese medicine and pharmacy, acupuncture
Jilin Medical College, Jilin	1951	Health Bureau of Province	317	3	25	116	210	798	2	Medicine, medical inspection
Yanbian Medical College, Yanji	1948	Health Bureau of Province	225	6	40	201	121	776	20	Medicine, pharmacy
Liaoning										
China Medical University, Shenyang	1931	Ministry of Health	404	9	67	390	310	1,573	320	Medicine, stomatology, pediatrics, forensic medicine, public health, nursing
Dalian Medical College, Dalian	1947	Health Bureau of Province	316	15	84	235	104	801	59	Medicine, stomatology, public health
Jinzhou Medical College, Jinzhou	1946	Health Bureau of Province	240	1	31	235	302	1,350	25	Medicine
Liaoning College of Traditional Chinese Medicine, Shenyang	1958	Health Bureau of Province	358	3	24	118	90	698	25	Traditional Chinese medicine and pharmacy, acupuncture, traditional Chinese orthopedics
Shenyang School of Medicine, Shenyang	1978	Health Bureau of Province	174	—	2	152	77	400	—	Medicine, public health
Shenyang Pharmacy College, Shenyang	1948	Medicinal Administration Bureau	300	3	40	—	—	—	73	Basal pharmacy, pharmacy, pharmaceutics, microbial production, traditional Chinese pharmacy
Ningxia										
Ningxia Medical College, Yinchuan	1958	Health Bureau of Autonomous Region	195	1	14	165	162	662	24	Medicine, public health, experimental technology
Qinghai										
Qinghai Medical College, Xining	1958	Education Bureau of Province	201	1	14	145* 31†	148* —	569* 134†	16	Medicine, traditional Chinese medicine, plague prevention

Shandong										
Binzhou Medical College, Binzhou	1983	Health Bureau of Province	248	1	14	237	255	1,082	—	Medicine
Changwei Medical College, Weifang	1950	Health Bureau of Province	303	—	19	306	296	1,439	—	Medicine
Heze School of Medicine, Heze	1958	Health Bureau of Province	126	—	2	265	80	621	—	Medicine
Jining School of Medicine, Jining	1974	Health Bureau of Province	178	—	10	327	304	936	—	Medicine, public health
Qingdao Medical College, Qingdao	1956	Health Bureau of Province	398	12	41	244	248	1,132	39	Medicine, pediatrics, medical inspection radiology
Shandong College of Traditional Chinese Medicine, Jinan	1958	Health Bureau of Province	328	4	13	121	159	860	63	Traditional Chinese medicine and pharmacy, acupuncture
Shandong Medical University, Jinan	1948	Ministry of Health	718	17	82	292	312	1,539	214	Medicine, stomatology, public health, pharmacy, nursing
Taishan Medical College, Taian	1983	Health Bureau of Province	241	—	8	221	121	1,041	—	Medicine, radiology
Yishui School of Medicine, Yishui	1974	Health Bureau of Province	115	—	1	246	201	650	—	Medicine
Shanghai										
Shanghai College of Traditional Chinese Medicine, Shanghai	1956	Education Bureau of City	299	10	37	157	123	637	136	Traditional Chinese medicine and pharmacy, acupuncture and massage
Shanghai Medical University, Shanghai	1926	Ministry of Health	798	50	92	279	244	1,156	469	Medicine, preclinical medicine, medical engineering, forensic medicine, medical inspection, public health, pharmacy, pharmacology, pharmaceutics, nursing, public health management
Shanghai Railway Medical College, Shanghai	1978	Ministry of Railways	237	—	17	166	—	617	—	Medicine, stomatology
Shanghai Second Medical University, Shanghai	1953	Education Bureau of City	710	55	108	544	464	2,075	288	Medicine, stomatology, pediatrics, medical inspection, medical engineering

TABLE 3—*Continued*

Province/School	Year Started	Responsible Agency	Teaching Staff			Medical Students			Graduate Students	Programs
			Total	Prof.	Assoc. Prof.	Admitted	Graduated	Total Enrolled		
Shanxi										
Datong School of Medicine, Datong	1958	Education Bureau of Province	160	—	—	203* 99†	208* 100†	553* 304†	—	Medicine, traditional Chinese medicine
Shanxi Medical College, Taiyuan	1950	Education Bureau of Province	679	11	92	245	245	1,230	110	Medicine, pediatrics, forensic medicine, public health, stomatology, pharmacy
South-East Shanxi School of Medicine, Changzhi	1958	Education Bureau of Province	198	—	5	219	259	585	—	Medicine, nursing, uterology
Shaanxi										
Huashan School of Medicine for the Metallurgical Industry, Huayin	1960	National Nonferrous Metal Industrial Corporation	187	—	4	89	68	409	—	Medicine, radio-medicine
Shaanxi College of Traditional Chinese Medicine, Xianyang	1958	Higher Education Bureau of Province	271	—	11	168	170	708	52	Traditional Chinese medicine and pharmacy, acupuncture
Xian Medical University, Xian	1937	Ministry of Health	585	15	93	273	354	1,827	244	Medicine, stomatology, pharmacy, public health, forensic medicine
Yanan Medical College, Yanan	1978	Higher Education Bureau of Province	95	—	3	80	39	241	—	Medicine
Sichuan										
Chengdu College of Traditional Chinese Medicine, Chengdu	1956	Higher Education Bureau of Province	324	1	30	171	190	1,041	54	Traditional Chinese medicine and pharmacy, acupuncture
Chongqing Medical University, Chongqing	1956	Higher Education Bureau of Province	642	12	103	317	378	1,559	121	Medicine, pediatrics, medical inspection, family planning management

Luzhou Medical College, Luzhou	1958	Higher Education Bureau of Province	346	1	23	275* 60†	376* 60†	1,528* 312†	—	Medicine, traditional Chinese medicine
North Sichuan Medical College, Nanchong	1964	Higher Education Bureau of Province	223	—	11	289	278	787	—	Medicine, radiology
West China Medical University, Chengdu	1910	Ministry of Health	887	43	192	242	271	1,114	490	Medicine, stomatology, forensic medicine, public health, hygienic inspection, nutrition hygiene, pharmacy, pharmaceutical chemistry, experimental technology
Tianjin										
Tianjin College of Traditional Chinese Medicine, Tianjin	1978	Higher Education Bureau of City	274	1	29	65	126	500	51	Traditional Chinese medicine and pharmacy, acupuncture, traditional Chinese orthopedics, traditional Chinese traumatology
Tianjin Medical College, Tianjin	1952	Higher Education Bureau of City	593	22	91	259	286	1,306	192	Medicine, stomatology, nursing, public health
Tianjin Second Medical College, Tianjin	1978	Health Bureau of City	307	—	7	60	52	150	—	Medicine, radiology, medical inspection, pharmacy
Tibet Autonomous Region										
The Department of Medicine of Tibet College of Nationalities, Xianyang, Shanxi	1983	Education Bureau of Autonomous Region	24	—	2	40	42	81	—	Medicine
Xinjiang Uygur Autonomous Region										
Shihezi Medical College, Shihezi	1958	Ministry of Agriculture, Animal Husbandry and Fishery	141	—	3	208	151	786	—	Medicine, pharmacy

TABLE 3—*Continued*

Province/School	Year Started	Responsible Agency	Teaching Staff			Medical Students			Graduate Students	Programs
			Total	Prof.	Assoc. Prof.	Admitted	Graduated	Total Enrolled		
Xinjiang Medical College, Urumqi	1955	Education Bureau of Autonomous Region	384	16	40	296	213	1,165	58	Medicine, preclinical medicine, public health, pharmacy, plague prevention
Yunnan										
Dali Medical College, Dali	1982	Education Bureau of Province	119	—	—	95	—	392	--	Medicine
Kunming Medical College, Kunming	1956	Education Bureau of Province	606	22	37	391	297	1,768	84	Medicine, stomatology, public health, forensic medicine
Yunnan College of Traditional Chinese Medicine, Kunming	1956	Education Bureau of Province	193	—	6	130	143	830	15	Traditional Chinese medicine and pharmacy, acupuncture and massage
Zhejiang										
Wenzhou Medical College, Wenzhou	1958	Health Bureau of Province	276	1	16	216	149	1,002	24	Medicine, pediatrics
Zhejiang College of Traditional Chinese Medicine, Hangzhou	1959	Health Bureau of Province	199	3	14	180	180	921	10	Traditional Chinese medicine, acupuncture
Zhejiang Medical University, Hangzhou	1912	Health Bureau of Province	564	16	99	310	308	1,675	165	Medicine, stomatology, pharmacy, clinical nutrition, medical engineering

* Western medicine students.

† Traditional Chinese medicine students.

‡ Mongolian medicine students.

Relationship of Scholarships and Indebtedness To Medical Students' Career Plans

Thomas H. Dial, Ph.D., and Paul R. Elliott, Ph.D.

Abstract—Discriminant functions analyses of data from the 1983 survey of senior medical students by the Association of American Medical Colleges showed that the effects of scholarships must be taken into account when assessing the influence of indebtedness on medical students' career choices. Receipt of a federal scholarship, type of medical school attended (public or private), marital status, sex, and receipt of a nonfederal scholarship were found to be more powerful than indebtedness as predictors of whether the students preferred primary care or nonprimary care specialties. Receipt of a federal scholarship, type of school attended, and sex were found to be more powerful than indebtedness as predictors of whether the students preferred private clinical practice, salaried clinical practice in a hospital or clinic, salaried clinical practice in a public agency, or a nonclinical career. Indebtedness was found not to be a predictor of willingness to locate in a socioeconomically deprived area.

In spite of a growth in the supply of physicians that is expected to continue into the next decade, problems with the availability of health care remain because of the distribution of physicians geographically and among specialties (1, 2). Moreover, a shortage of minority physicians exacerbates the distribution problem because minority physicians tend to be more inclined than nonminority physicians to practice in medically underserved areas (3).

Because of recent and continuing reductions in scholarships and other forms of financial aid by the federal government, accompanied by increased tuition costs, medical students have had to borrow more heavily than previously to meet their educational expenses. The growing financial burden faced by future medical students, particularly those from minority and low-income families, may contribute to continuing physician distribution problems. The prospect of large debt may discourage minority students from seeking medical careers and thus delay improvement in the availability of health care among the poor and others who live in underserved areas.

At least two hypotheses have been put forward to explain how indebtedness might influence medical students' specialty choices: first, that high indebtedness tends to motivate students to choose higher-paying specialties (4, 5) and, second, that indebtedness tends to motivate

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them to select specialties requiring minimum training periods (6–9).

Previous studies have found that medical students' general background characteristics were stronger predictors than indebtedness of specialty choice and of interest in practicing in underserved areas (10, 11). The effect of indebtedness on specialty choice was found to depend on whether the indebtedness was incurred from a subsidized or nonsubsidized educational loan program (12).

The authors' purpose in the present study was to examine the effects and interrelationships of debt and other financial and demographic factors that influenced the career choices of 1983 medical school graduates. The specific career choices examined were the decision to become certified in either a primary care specialty or a nonprimary care specialty, the decision to establish a traditional private practice or enter some other kind of medical career, and a willingness to locate in a socioeconomically deprived area. The authors evaluated the influence of the type of scholarship or grant (if any) received by students during medical school and the influences of indebtedness and other relevant factors on the students' career plans. Data limitations made it impossible to assess separately the effects of indebtedness incurred from different loan programs. No previously published study has investigated the effects of receiving scholarships. However, unless information on receiving scholarships is included in analyses of career plans, the effects of scholarships may be mistakenly attributed to low indebtedness or to other correlates of having received a scholarship.

Methods

Each year the Association of American Medical Colleges conducts a survey of all senior medical students enrolled in its member institutions. Data for this paper were obtained from the 1983 survey. The survey solicits information from medical school seniors under four main headings: graduate medical education plans, career plans, medical school experiences and curriculum, and demographic and financial information.

Students at all 124 accredited U.S. medical schools granting M.D. degrees participated in the 1983 survey. The overall response rate was 66.3 percent. The response rates did not vary substantially by sex or between public and private medical schools, but there were sizable differences by ethnic self-description. Members of underrepresented minority groups were almost one-third less likely and members of other minority groups about one-tenth less likely to respond to the survey than were nonminority students. "Underrepresented" minority groups are those whose numbers among U.S. medical students are proportionally smaller than their numbers in the population as a whole. "Other" minority groups are those that are not underrepresented among medical students.

The available evidence suggests that data from the graduation survey are highly reliable and valid. For example, the mean amount of debt reported by the students on the 1983 survey ($23,815) differed by only 0.7 percent from the mean indebtedness of senior students ($23,647) reported by financial aid officers on the 1983 survey conducted by the Liaison Committee on Medical Education.

VARIABLES

The demographic and background variables examined were sex, ethnic self-description, marital status, number of dependents, receipt of a scholarship, type of scholarship, and whether the student attended a public or private medical school.

Ethnic self-description was sorted into three categories: underrepresented minorities, other minorities, and nonminority respondents. Minority groups that are underrepresented in medical schools are blacks, American Indians, Mexican-Americans (Chicanos), and U.S. mainland residents of Puerto Rican heritage. "Other" minorities (that is, those who are not underrepresented among medical students) are Commonwealth Puerto Ricans, other Hispanics, Asian-Americans, and Pacific Islanders.

The survey questionnaire asked respondents to indicate which (if any) of seven types of scholarships they received: Armed Forces Health Professions Scholarship Program, National Health Service Corps Scholarship Program, state-funded programs, school-awarded programs, foundation-funded programs, local charitable organizations, or other. These types were classified into two categories: federally funded (Armed Forces Health Professions Program and National Health Service Corps scholarships) and all others (those funded by states, schools, foundations, local charitable organizations, and other sources).

Marital status was defined by six categories in the questionnaire: never married, separated, divorced, widowed, engaged, or married. These categories were combined into three: married; separated, widowed, or divorced; and all others.

For the analysis of the effects of indebtedness on career plans, the outcome variables were defined and measured as follows:

Preferred specialty was defined as either a primary care or nonprimary care specialty. The Health Professions Educational Assistance Act of 1976 (P.L. 94-484) identifies the primary care specialties as family practice, general internal medicine, and general pediatrics. All other specialties, including the subspecialties of internal medicine and pediatrics, were defined in the present paper as nonprimary care specialties.

To determine the students' career plans, the questionnaire asked for the preferred practice setting (if the student planned to enter clinical practice) and preferred type of career activity and asked whether the respondent would consider locating in a socioeconomically deprived area.

Data on the preferred career activity were taken from a question that asked the students to designate their first, second, and third choices from the following list of activities: full-time academic faculty appointment; salaried research scientist; private clinical practice alone, with one partner, or in a group; salaried clinical practice in a hospital, a clinic, or a government agency; or administration with no practice. Only the respondent's first choice from this list was used as a variable in the present analysis. For this paper, the students' preferred career activities were arranged into four categories: private clinical practice; salaried clinical practice in a clinic or hospital; salaried clinical practice in a state or federal agency; and academic, research, or administrative activities. This reclassification was prompted by the authors' recognition that the respondents who planned to be employed by government agencies differed in important ways from those who planned to practice in hospitals and nongovernment clinics.

STATISTICAL METHODS

A series of discriminant functions analyses were used to test the power of indebtedness and other student and school characteristics (the predictor or discriminating variables) to discriminate among the groups of graduates who expressed different career preferences (the predicted or grouping variables). A discriminant function is, as the name implies, a mathematical function; it has no concrete interpretation or one-to-one correspondence with any single variable. The function has an empirically derived value, which is jointly determined by all the discriminating variables, for each individual in the sample. The average value of the function varies (more or less, depending on the success of the analysis) from one outcome category to another. In other words, the function mathematically discriminates among outcome categories; hence, the name.

The maximum number of discriminant functions that can be computed for any set of variables is equal to one less than the number of categories defined by the grouping variable. Thus, in the simple case where the grouping variable divides the sample into two categories (for instance, those preferring primary care specialties and those preferring nonprimary care specialties), only one function is computed, and the interpretation is generally quite straightforward. When the grouping variable divides the sample into more than two categories (as, for instance, in the analysis of career activity preferences), the interpretation is more complex.

A complete interpretation of the results of a discriminant analysis involves, first, assessment of the relative contribution of each discriminating variable to the total discriminating power of the function or set of functions and, second, assessment of the correlation of each function with each outcome category. The present study is primarily concerned with the first of these two assessments; therefore, that aspect of the interpretation is emphasized in the findings that follow.

Levels of statistical significance are not reported here because the data were taken from a survey of the entire population of 1983 U.S. medical school seniors rather than from a sample. If the respondents were assumed to be a random sample comprising approximately two-thirds of the total population, tests of statistical significance could be performed using a finite population correction factor. With very large samples, however, the confidence intervals around sample statistics become quite small. Given a sample size of more than 10,000 and the further enhancement of the finite population correction factor, the probability values for all statistics produced by discriminant analysis would be smaller than .001. Under these circumstances, it becomes possible to dispense with discussions of statistical significance and proceed directly to the question of the findings' practical importance (for which, regrettably, statistical significance is sometimes mistaken).

The "discriminant" procedure of the Statistical Package for the Social Sciences (13) was used. The analysis was done stepwise by using the minimum residual method. Under these specifications, the program first selects from the list of discriminating variables the one that, on the basis of *a priori* statistical criteria, appears to be the most powerful discriminator. This variable is entered into the equation(s) first. Of the remaining variables, the one that accounts for the maximum residual variance is added next, and so on. If at any point in the process the total discriminating power of the equation can be increased by removing a variable, this is done. At the end of the sequence, a set of standardized canonical discriminant function coefficients is produced. Comparison of the relative magnitudes of these coefficients reveals the relative contribution of each variable to the total discriminating power of each function. Usually, the rank ordering by absolute value of the coefficients for the first function corresponds approximately to the sequence in which the variables were added to the equation.

The career preferences used as grouping variables were specialty choice, preferred career activity, and willingness to locate in a socioeconomically deprived area. In order to obtain interpretable results, it was necessary to translate the discriminating variables except for indebtedness and number of dependents into binary variables (that is, variables having values of either zero or one). The resulting variables were named and coded as follows: "female" (1 if female; zero if male); "underrepresented minority" (1 if member of an underrepresented minority group; zero otherwise); "other minority" (1 if member of a non-underrepresented minority group; zero otherwise); "federal scholarship" (1 if received a federal scholarship; zero otherwise); "nonfederal scholarship" (1 if received a nonfederal scholarship; zero otherwise); "private school" (1 if attended a private medical school; zero otherwise); "married" (1 if married, zero otherwise); and "separated/widowed/divorced" (1 if separated, widowed, or divorced; zero otherwise).

Findings

The relationship between receipt of a scholarship and indebtedness varied a great deal from one type of scholarship to another. Federal scholarship recipients were more likely than nonrecipients (21.3 percent as compared with 17 percent) to report that they had no debt. Only 4 percent of nonfederal scholarship recipients said they had no debt.

Indebted recipients of federal scholarships reported mean debts of $14,537 (S.D. = $11,454), which was $7,663 less than the mean indebtedness of those who received no scholarships ($22,200; S.D. = $13,051). Indebted recipients of nonfederal scholarships had a mean indebtedness of $28,685 (S.D. = $14,353), which was $6,485 higher than that of nonrecipients. The latter difference occurs because nonfederal scholarships tend to be need-based and, therefore, to be awarded to students who must also borrow and because these scholarships are somewhat more prevalent at private schools than at public schools.

A total of 8,667 responses was used in the discriminant analysis of the students' preferences for primary care versus nonprimary care specialties. Six of the 10 discriminating variables were entered into the equation in the following sequence: federal scholarship, private school, married, female, nonfederal scholarship, and total educational indebtedness. The other four discriminating variables—underrepresented minority, other minority, separated/widowed/divorced, and number of dependents—failed to meet the minimum statistical criteria for inclusion in the equation.

The standardized canonical discriminant function coefficients from this analysis of specialty preference were: for federal scholarship, .71; for private school, −.59; for married, .32; for female, .31; for nonfederal scholarship, .22; and for total debt, −.11. These findings show that receipt of a federal scholarship is the most powerful discriminating variable associated with the selection of a primary care specialty. Attendance at a private medical school was strongly associated with selection of a nonprimary care specialty. Sex and marital status were moderately powerful discriminating variables; women tend more than men and married students more than unmarried students to prefer primary care specialties. Indebtedness was evidently a less powerful discriminating variable than any of the foregoing, but large debts were somewhat associated with a tendency to prefer nonprimary care specialties.

The standardized canonical discriminant function coefficients for the analysis of preferred career activity are presented in Table 1. The number of responses used in this analysis of preferred career activity was 9,445. Nine of the 10 discriminating variables were entered into the equations in the following sequence: federal scholarship; private school; female; total educational indebtedness; other (that is, not underrepresented) minority; nonfederal scholarship; married; number of dependents; and underrepresented minority. Separated/widowed/divorced failed to meet the minimum statistical criteria for inclusion in the equations.

Indebtedness evidently was a more powerful predictor of preferred career activity than of specialty preference and willingness to locate in a deprived area. Its power as a discriminating variable was, however, again exceeded by the variables of receipt of a federal scholarship, attendance at a private medical school, and sex. Receipt of a federal scholarship was strongly associated with the expectation of being employed by a government agency. Attending a private school was associated with plans for an academic, research, or administrative career, and being a woman was associated with the expectation of salaried practice in a hospital or clinic. High indebtedness tended to be associated with the intent to enter academia, research, or administration, a

TABLE 1

Standardized Canonical Discriminant Function Coefficients (Showing the Relative Contributions of Selected Variables to Three Discriminant Functions) and Values of the Functions at Group Means (Showing the Relationship of Each Function to the Career Activity Preferences) of 9,445 Medical Graduates Who Responded to the 1983 Graduation Survey of the Association of American Medical Colleges

Variables/Preferences	Coefficients/Values		
	Function 1	Function 2	Function 3
Discriminating variables			
Federal scholarship	.87	.14	−.13
Private medical school	−.20	.72	−.39
Female	.13	.44	.85
Total debt	−.25	−.10	.30
"Other" minority	.15	.13	−.07
Nonfederal scholarship	−.04	.31	−.36
Married	.02	−.30	.14
Number of dependents	.05	−.04	−.13
Underrepresented minority	−.05	−.12	.05
Career preferences			
Private clinical practice	−.04	−.16	.00
Clinical practice in a hospital or clinic	.11	.24	.32
Clinical practice in a government agency	1.53	.11	−.13
Administration, teaching, research	−.25	−.10	.30

finding that is consistent with the fact that the students who have such plans are more likely to have attended private schools, less likely to have received federal scholarships, and more likely to have received nonfederal scholarships than any other group. Membership in a minority ethnic group (either underrepresented or not), marriage, and the number of dependents were positively associated with plans to be employed by a government agency.

Interpretation of the findings regarding a student's willingness to consider locating in a socioeconomically deprived area is unavoidably subjective. On the 1983 questionnaire this question read, "Would you consider locating in a socioeconomically deprived area?" The meanings of the terms "socioeconomically deprived" and "consider" were left entirely to the student's interpretation. The lack of clarity as to the meaning of responses to this item is illustrated by the consequences of a wording change in the question. In 1984 this item was changed to, "Do you plan to locate in a socioeconomically deprived area?" The percentage who answered "yes" dropped from 60 percent to 17 percent.

A total of 8,251 responses were included in this analysis of location in a socioeconomically deprived area. Seven of the 10 discriminating variables were entered into the equation in the following sequence: underrepresented minority; federal scholarship; female; nonfederal scholarship; private school; other (that is, not underrepresented) minority; and married. Number of dependents, separated/widowed/divorced, and total educational indebtedness failed to meet the minimum statistical criteria for inclusion in the equation.

Receipt of a federal scholarship proved to have a greater standardized canonical discriminant function coefficient than being a member of an underrepresented minority, despite the fact that the latter variable was entered into the equation first. The standardized discriminant function coefficients from this analysis of a willingness to consider locating in a deprived area were: for federal scholarship, .62; for underrepresented minority, .54; for female, .37; for nonfederal scholarship, .35; for private school, −.33; for "other" minority, .16; and for married, −.08.

The authors consider it remarkable, in view of the small percentage of underrepresented minority respondents to the 1983 graduation survey, that membership in an underrepresented minority group was such a powerful predictor of willingness to locate in a socioeconomically deprived area. It is also noteworthy that, based on the outcome of this analysis, indebtedness evidently played no discernible role in determining whether the students would consider locating in a deprived area after completing training.

Being a woman and having received a nonfederally sponsored scholarship to medical school were moderately associated with a willingness to consider locating in a deprived area, while attendance at a private school was moderately associated with an unwillingness to consider it. Membership in a nonunderrepresented minority group and being married were relatively weak discriminators: the former was positively and the latter negatively associated with willingness to locate in a deprived area.

Discussion

The inflation-adjusted average educational indebtedness of medical school graduates has been increasing for a number of years. This increase has raised concerns that indebtedness could become a primary determinant of medical students' plans for specialty certification, practice location, and type of practice. The fear has been that newly graduated physicians' educational debts might force them to make career choices at odds with policymakers' efforts to alleviate or prevent shortages of primary care physicians, particularly in underserved and economically depressed areas.

Receipt of a federal scholarship affects a medical student's career plans in unique ways. The scholarship's service requirements dictate the course of the new physician's career at least for the first few years following graduation. At the same time, the scholarship greatly alleviates the financial burden of attending medical school. The situation of federal scholarship recipients thus differs significantly from that of other medical students with respect to indebtedness and career plans.

The findings of the present study suggest that, at least for the class graduating in 1983, other variables are more powerful than indebtedness as predictors of medical students' career choices. Whether or not the student received a federally sponsored scholarship to medical school was the most powerful predictor of career plans.

However, this study did not find the influence of indebtedness on medical student career plans to be nonexistent. Among the 1983 medical school graduates, high indebtedness was associated with a tendency to choose nonprimary care specialties and to plan a career in teaching, research, or administration rather than in clinical practice. The findings suggest that indebtedness had little or no effect on these students' willingness to consider locating in a socioeconomically deprived area.

The 1983 graduating class attended medical school during the peak years of the National Health Service Corps Scholarship Program. As such programs decline and as medical students are forced to rely increasingly on market-rate loans as their main source of financial assistance, the concomitant problems of rising indebtedness, interest capitalization, and repayment may increase the proportion of students who select nonprimary care specialties. If these developments reduce the number of minority students who are able to attend medical school, progress toward the alleviation of physician shortages in economically depressed areas could also be slowed or reversed.

The full effects of heavier borrowing at higher interest rates should become apparent with the 1986 and 1987 graduating classes. Important questions in at least two broad categories have thus far gone largely unaddressed in the literature. The first of these categories is the influence of family economic background on students' propensity to borrow and on their career expectations. Students from affluent families may be more concerned about the tax deductibility of the interest and less concerned about the difficulty of repaying loans than those from less affluent backgrounds. Nor has the literature revealed much about the effects of general market conditions on these processes. Judging by medical students' willingness to incur large debts, many evidently continue to believe they will be entering a "seller's market" for physician services. The research reported to date provides little data about possible changes in this perception or about the effects of such recent events as dropping interest rates and tax reform.

Future multivariate analyses of the kind reported should be performed separately for federal scholarship recipients and nonrecipients. These analyses would help to clarify further the ways in which changing financial circumstances influence medical students' thinking about their careers.

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DATAGRAM

Reapplicants to U.S. Medical Schools, 1983 Through 1986

Although most applicants to medical school in a given year are applying for the first time, a substantial number are reapplying after an unsuccessful attempt in a previous year. Since these reapplicants are in general less successful than first-time applicants in gaining admission, the overall statistics covering both kinds of applicants that are published in the annual editions of *Medical School Admission Requirements* (1) and the annual education issues of the *Journal of the American Medical Association* (2) may portray a bleaker picture of the difficulty of gaining entry to medical school than is warranted.

Repeat applicants are important to the applications process, because they represent a reservoir of prospective students who augment the pool of individuals making the normal progression from baccalaureate programs. As the number of applicants declines, the percentages of both first-time applicants and reapplicants who are accepted increase.

Until recently, good statistical information on reapplicants was difficult to derive because it required combining information collected in several application years. However, since the completion of the Student and Applicant Information Management System of the Association of American Medical Colleges (AAMC) in 1973, collated data on all applicants to U.S. medical schools have been available. The report presented here includes information on applicants for the entering classes of 1983 through 1986 but takes into account previous applications since 1980. A previous datagram presented data on reapplicants 1981–1984 (3), and less complete information on reapplicants for earlier years was included in prior AAMC publications (4, 5).

Method

For each application year, a previously unsuccessful applicant was defined as an individual who had also applied in one or more of the preceding three years. Although this approach may have resulted in identifying as a first-time applicant the rare individual who may have applied again after a hiatus of more than three years, it allowed consistent treatment of each of the four application years in the study. Thus, for example, for 1983 a previously unsuccessful applicant was one who had applied at least once in the years 1980 through 1982 and again in 1983; and for 1986 a previously unsuccessful applicant was one who had applied at least once in 1983 through 1985 and again in 1986.

The previously unsuccessful applicants were further subdivided into those who applied in only one prior year and those with several prior applications. The group of those who had applied in one prior year was further subdivided into those applying in the previous year only and those applying in an earlier single year.

Previously matriculated applicants were the small number of applicants each year who had attended medical school during the previous three years but had dropped out or had been dismissed. Previously accepted applicants were those who had received an acceptance in one of the previous three years but had not matriculated.

The remainder of the students, that is, those who had no record of an application within three years, were considered first-time applicants. All of the categories are mutually exclusive; thus, the sum of the numbers of applicants, accepted students, or matriculants in all the categories is equal to the number of all applicants, all accepted students, or all matriculants, respectively. The percentage accepted in each category is the number of applicants who were accepted divided by the number of applicants, and the percentage matriculated is the number who matriculated divided by the number of applicants.

Results and Discussion

As shown in Table 1, the aggregate number of applicants declined appreciably, and the aggregate number of accepted students and ma-

TABLE 1

Numbers and Percentages of Applicants to U.S. Medical Schools, by Application Status, 1983 Through 1986

Applicants' Status	1983		1984		1985		1986	
	No.	Percent	No.	Percent	No.	Percent	No.	Percent
First-time applicants								
Applied	25,317	100.0	26,059	100.0	23,517	100.0	23,141	100.0
Accepted	13,444	53.1	13,520	51.9	13,298	56.5	13,310	57.5
Matriculated	12,878	50.9	12,927	49.6	12,567	53.4	12,558	54.3
Previously unsuccessful applicants								
One prior application								
In year prior								
Applied	5,178	100.0	5,341	100.0	5,172	100.0	4,025	100.0
Accepted	2,065	39.9	2,082	39.0	2,273	43.9	1,891	47.0
Matriculated	1,999	38.6	1,997	37.4	2,168	41.9	1,817	45.1
In other year								
Applied	1,678	100.0	1,593	100.0	1,474	100.0	1,583	100.0
Accepted	516	30.7	460	28.9	489	33.2	638	40.3
Matriculated	493	29.4	441	27.7	463	31.4	611	38.6
Two or three prior applications								
Applied	2,284	100.0	2,199	100.0	2,005	100.0	1,704	100.0
Accepted	765	33.5	716	32.6	726	36.2	681	40.0
Matriculated	742	32.5	686	31.2	699	34.9	658	38.6
Previously accepted applicants								
Applied	434	100.0	446	100.0	484	100.0	590	100.0
Accepted	388	89.4	388	87.0	410	84.7	530	89.8
Matriculated	351	80.9	328	73.5	345	71.3	437	74.1
Previously matriculated applicants								
Applied	309	100.0	306	100.0	267	100.0	280	100.0
Accepted	31	10.0	28	9.1	32	12.0	42	15.0
Matriculated	17	5.5	16	5.2	26	9.7	22	7.9
All applicants								
Applied	35,200	100.0	35,944	100.0	32,893	100.0	31,323	100.0
Accepted	17,209	48.9	17,194	47.8	17,228	52.4	17,092	54.6
Matriculated	16,480	46.8	16,395	45.6	16,268	49.5	16,103	51.4

triculants declined very slightly over the three-year period ending in 1986. The number of applicants declined by 8.6 percent, the number accepted by 1.0 percent, and the number matriculated by 2.5 percent. The overall probability of being accepted ranged between 47.8 and 54.6 percent during 1983–1986.

First-time applicants were 73.9 percent of all applicants in 1986 but were 78.0 percent of matriculants. The proportion of first-time applicants accepted in 1986 was 57.5 percent, which was substantially higher than for any of the groups of previously unsuccessful applicants.

In 1986, 47.0 percent of the individuals who applied for the second consecutive year were accepted, while only 40.3 percent of those who applied for the second time after a hiatus were accepted.

More than 1,700 of the applicants who applied in 1986 were doing so for at least the third time. These individuals had a considerably lower chance of success than first-time applicants, but more than one-third of them were eventually accepted and matriculated.

The previously accepted group had an acceptance rate in 1986 of 89.8 percent, which is higher than that of any of the other groups reported. However, many of these individuals had been granted deferred matriculation by the school that originally accepted them. The author has not analyzed the data to separate those previously accepted at the same school from those previously accepted at another school or to separate those already accepted in the previous year from those accepted in an earlier year. This group of previously accepted applicants is small but definitely growing, rising from 434 in 1983 to 590 in 1986. Of the individuals accepted from this group in 1986, 17.5 percent did not matriculate; in contrast less than 6 percent of accepted first-time applicants that year failed to matriculate.

The previously matriculated applicants were unlikely to gain a second chance at medical education. Only 15.0 percent were accepted in 1986, and only 7.9 percent matriculated.

The percentage accepted and percentage matriculated increased appreciably over the three-year period for all groups except the previously accepted applicants, where the percentages were already very high. Changes observed for the period 1983–1986 were greater than changes found in the prior analysis for the period 1981–1984 (3).

To summarize, almost three quarters of all applicants in any given year are first-time applicants. Reapplicants have a smaller but still good chance of acceptance. The probability of acceptance is increasing as the numbers of applicants of almost all types decline.

PAUL JOLLY, PH.D., *associate vice president for operational studies, Association of American Medical Colleges, Washington, D.C.*

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Physicians' Assessment of Deficiencies And Desire for Training in Adolescent Care

Robert Blum, M.D., Ph.D.

Abstract—Over the past decade, there has been growing awareness among medical educators and care providers of the deficits in the training of primary care physicians to meet the health care needs of adolescents. The study reported here is the first national survey of primary care physicians' perceptions of their competency in dealing with adolescents' health concerns. In the survey, 351 internists, family practitioners, and pediatricians rated their competency in 19 areas of adolescent health care. Approximately three-quarters or more of the internists indicated deficits in all 19 areas. In areas related to gynecologic concerns, more pediatricians reported deficits than family physicians; but more family physicians than pediatricians reported deficiencies in managing acute conditions of youth (growth and developmental problems, endocrinopathies, school-based problems, and chronic illnesses). All physicians indicated deficiencies in dealing with high-risk health behaviors: eating disorders, drug and alcohol abuse, homosexuality, and delinquency. Finally, more than 45 percent of the physicians overall reported deficiencies in areas related to social and/or emotional concerns, including suicide, depression, and family conflicts. Despite these acknowledged deficits, most of the primary care physicians did not indicate adolescents to be the least desirable age group with which to work. However, few of the physicians expressed a desire to improve their skills. Overall, in none of the 19 areas did more than 30 percent of the physicians who had reported deficiencies in an area express interest in improving their competency.

In the 1980s, studies in the United States and Canada have indicated adolescent health to be one of the major areas of training and knowledge identified as deficient by physicians (1, 2). At the same time, primary care physicians are increasingly confronted with issues of adolescent health care that previously they had been able to ignore or refer. Adolescent sexuality and pregnancy, drug use and abuse, physical and sexual abuse, disabling physical conditions, eating disorders, family conflict, and learning disabilities are but a few of the conditions confronting the primary care physician who sees adolescents. The present study was undertaken to identify the areas of adolescent health care in which family physicians, internists, and pediatricians in the United States

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perceived deficiencies in their knowledge and/or training. Also, the areas in which these physicians desired to improve their competency were identified.

Methods

As one component of a larger multidiscipline study, 751 physicians in family practice, internal medicine, and pediatrics were identified nationally using a random selection process. These physicians' names were drawn from the rosters of the American Academy of Family Practice, American College of Physicians, and American Academy of Pediatrics. These physicians were sent a questionnaire in 1985, and 351 responded. The overall response rate was 46.7 percent, with 37.9 percent of the family physicians, 52.1 percent of the internists, and 54.2 percent of the pediatricians responding.

The questionnaire was developed by the author, reviewed by consultants from each of the three specialties surveyed, and subsequently tested on approximately 50 physicians. The questionnaire was revised and mailed to the sample. To increase the response rate, the questionnaire was mailed twice to the same physicians two weeks apart. Nonrespondents to the second mailing received follow-up telephone calls during which an abbreviated questionnaire was completed.

The questionnaire asked respondents to provide information on their age, specialty and subspeciality, board certification status, size of community, and type of practice setting. They were asked the percentage of adolescents in their practice and which patient age group they liked seeing least. Using a checklist, respondents were asked to indicate in which of 19 areas of adolescent health care they felt they had deficiencies and in which of these areas of deficiency they desired to improve their competence through continuing education.

The responses were collected and tabulated with the assistance of a national survey firm. Use of a randomized sampling technique for the responses of those who were members of the American Association of Family Physicians and the American College of Internal Medicine revealed that the findings were generalizable to all physician members of those organizations. For pediatricians, a disproportionate number of the respondents were members of the Section on Adolescent Medicine of the American Academy of Pediatrics; therefore, the findings may not be generalizable to the entire membership of the academy.

Results

The respondents' demographic characteristics showed that the pediatricians tended to be older (chi-square = 34.5, $p < .001$) and were more likely to have specialty board certification (chi-square = 25.8, $p < .001$) than the other two groups. The internists and pediatricians were more likely to subspecialize than the family practitioners (chi-square = 40.3, $p < .001$). More pediatricians (40 percent) than the other groups specialized in social behavioral, developmental, public health, and adolescent medicine. Conversely 90 percent of the internists who subspecialized reported specializing in specific organ systems. The family physicians were more likely than the others to practice in communities of less than 25,000, while the internists and pediatricians were disproportionately represented in large urban centers. Finally, though the finding was not statistically significant, the family physicians tended to practice in private group or solo settings more than the other two groups, while the pediatricians were more likely than the others to be university- or hospital-based.

The internists were the least likely of the groups to see adolescents, with 11 percent reporting that they had almost no teenagers in their practice and an additional 64 percent reporting that less than 10 percent of their practice was composed of adolescents. Of the family physicians, more than half (58 percent) reported that 10 to 25 percent of their patient practice was composed of adolescents. Much like the internal medicine specialists, the family physicians almost never reported serving large adolescent populations (that is, more than 25 percent of their practice). By contrast, 36 percent of the pediatricians reported that adolescents comprised more than 25 percent of their practices. Even when controlling for those pediatricians who identified themselves as oriented toward adolescent health care, the pediatricians were still more likely to have sizable adolescent practices than their colleagues in the other primary care specialties.

When the respondents were asked which age group of patients they enjoyed seeing least, they rarely identified adolescents. Additionally, there were no identifiable, significant differences among the 10 percent of family physicians, 5 percent of pediatricians, and 12 percent of internists who reported adolescents to be their least favorite age group.

In assessing areas of deficiency, at least one-quarter of all of the physicians indicated deficiencies in each of the 19 categories examined (Table 1). However, the specialists differed in their assessments. First, approximately three-quarters or more of the internists reported deficiencies in all 19 areas. Second, in areas related to adolescent gynecology (family planning, pregnancy diagnosis, menstrual disorders, and sexually transmitted diseases), more of the pediatricians acknowledged deficiencies than family physicians (chi-square = 42.1, $p < .001$). On the other hand, more of the family physicians than pediatricians indicated deficiencies in areas related to the management of acute and chronic conditions of youth — the areas of growth and developmental problems, endocrinopathies, school-based problems, and chronic illnesses (chi-square = 125.8, $p < .001$). Third, all three groups reported deficiencies in dealing with the health problems of high-risk behaviors and/or life-styles (eating disorders, drug and alcohol abuse, homosexuality, and delinquency). Additionally, social and/or emotional concerns (suicide risk, depression, and family conflicts) were areas of weakness reported by more than 45 percent of the total respondents.

The respondents were asked to indicate the barriers they saw in managing adolescent health concerns. Lack of training, which was identified by 45 percent of respondents, was the primary barrier. A secondary yet important issue, identified by 36.8 percent, was the commitment of time needed to manage adolescent problems. A relatively insignificant barrier, identified by only 18.2 percent, was financial considerations.

The participants were also asked to indicate in which of the 19 areas they would like to improve their clinical competencies. Table 2 shows the percentage of those physicians who had indicated they were insufficiently trained in an area who reported they desired further training in that area. Despite their acknowledged deficiencies, few of the physicians expressed a desire to improve their skills. Overall, in none of the 19 areas did more than 30 percent of the physicians who had reported deficiencies in an area indicate an interest in improving their competency.

Those areas of deficiency in which the largest percentages of family physicians reported a desire for improvement were: menstrual disorders (42.3 percent), depression (39.2 percent), sports-related injuries and problems (38.7 percent),

TABLE 1

Numbers and Percentages of 351 Primary Care Physicians in Three Specialties Who Reported They Had Insufficient Training in 19 Areas of Health Care for Adolescents, 1985*

Areas	Specialties						Total (*n* = 351)	
	Family Practice (*n* = 125)		Internal Medicine (*n* = 50)		Pediatrics (*n* = 176)			
	No.	Percent	No.	Percent	No.	Percent	No.	Percent
Growth and development problems	61	48.8	45	90.0	30	17.1	136	38.7
Adolescent endocrinology	98	78.4	42	84.0	105	59.7	245	69.8
Acne	19	10.8	37	74.0	30	17.1	86	24.5
Obesity	33	26.4	39	78.0	42	23.9	114	32.5
Anorexia and/or bulimia	96	76.8	45	90.0	107	60.8	248	70.7
Sports-related injuries and health problems	31	24.8	46	92.0	102	57.9	179	51.0
Sexually transmitted diseases	19	15.2	37	74.0	51	29.0	107	30.5
Pregnancy diagnosis	14	11.2	39	78.0	38	21.6	91	25.9
Menstrual disorders	26	20.8	42	84.0	63	35.8	131	37.3
Alcohol and drug abuse assessment	54	43.2	41	82.0	90	51.1	185	52.7
Homosexuality	87	69.6	43	86.0	112	63.6	242	68.9
Family conflicts	56	44.8	46	92.0	62	35.2	164	46.7
Suicide risk assessment	66	52.8	48	96.0	87	49.4	201	57.3
School-based learning and/or behavior problems	94	75.2	48	96.0	58	33.0	200	57.0
Management of chronic illness	99	79.2	44	88.0	88	50.0	231	65.8
Depression	52	41.6	41	82.0	100	56.8	193	55.0
Birth control and/or family planning	17	13.6	41	82.0	71	40.3	129	36.8
Psychosomatic complaints	32	25.6	38	76.0	37	21.2	107	30.5
Delinquency	96	76.8	48	96.0	102	58.0	246	70.1

* Respondents were from a national, randomly selected sample of 751 specialists in family practice, internal medicine, and pediatrics.

school-based learning and behavior problems (38.3 percent), alcohol and drug abuse assessment (37.0 percent), and family conflicts (35.7 percent). For pediatricians, these areas were sports-related injuries (36.3 percent), family conflicts (35.5 percent), alcohol and drug abuse assessment (31.1 percent), and depression and suicide (30 percent each). Too few of the internists desired to improve their competencies in the 19 areas to make the analysis meaningful.

With regard to those areas in which 65 percent or more reported deficiencies (delinquency, management of chronic illness, homosexuality, anorexia and/or bulimia, and adolescent endocrinology), less than 30 percent of those in any specialty group reporting such deficiencies had an interest in upgrading their skills.

Discussion

Over the past 30 years, physicians have witnessed an ascendancy of what has been labeled the "new morbidities," which are associated with life-style and social factors. Although the major morbidities and mortalities for adolescents have shifted from primarily infectious to primarily social etiologies, the health care sector has been slow to respond. Health care providers see only a small fraction of those youths who sustain illness or disability from the new morbidities. Marks and colleagues (3), for example, have shown that adolescents have a large number of personal health concerns for which they would like professional assistance but never seek help: weight, birth control, emotional problems, and fatigue. The same study reported that over 20 percent of the youth regularly used illicit drugs but that only 1 percent had sought professional help for drug use and an additional 6 percent would have liked to do so.

There is mounting evidence that physicians feel poorly trained to meet the changing needs of adolescents. The present study indicated that teenagers are not shunned by physicians, because only 9 percent overall reported that they liked adolescents least of all age groups. Rather, most of the respondents felt insufficiently trained to assist with many of the problems faced by youth.

These findings are consistent with those of other surveys that have reported deficits in the skills and training needed by physicians to provide health care for youth. A national survey of physicians in Canada, for example, found that over 50 percent identified deficiencies in their training related to adolescent medicine (1). In 1978 the Task Force on Pediatric Education of the American Academy of Pediatrics reported that American pediatricians believed their skills in adolescent medicine to be a major weakness (2).

Other studies have noted comparable deficits. In Illinois, Rosenthal and Miller (4) reported adolescent medicine, behavioral pediatrics, delinquency, and drug abuse to be among the nine top priorities in continuing education for pediatricians. In 1983 Resnick (5) noted that primary care physicians (pediatricians, general practitioners, and family physicians) reported discomfort and lack of preparation in meeting the social and psychological consequences of the many medical conditions with which adolescents presented as major reasons for avoiding the adolescent population.

The interweave of adolescent medicine with behavioral and/or psychological issues is undeniable. However, youth are in no way unique in presenting with such concerns. In a British survey of pediatricians (6), most recognized that nearly one-third of all outpatient visits and a significant number of inpatient consultations were for problems predominantly emotional or behavioral in nature. Among family physicians, the same has been found. Stoudemire and colleagues (7) reported that family practitioners spend one-third of their professional time dealing with psychosocial disorders such as somatic complaints, symptoms of emotional distress, alcohol and drug abuse, and family or marital problems.

In the present study, social and/or emotional concerns were areas of deficiency identified by more than half of all physicians. However, of those who identified these concerns as areas of weakness in their training, less than one-third would choose to strengthen their skills in such areas—family conflict, substance abuse, eating disorders, and homosexuality.

A debate has raged among primary care specialists as to whose domain is adolescent health care. Although the American Academy of Pediatrics has identified the scope of pediatric practice to extend through 21 years of age (2), many hospitals restrict inpatient pediatric admissions

TABLE 2

Numbers and Percentages of Primary Care Physicians in Three Specialties Who Had Identified Themselves as Deficient in Each of 19 Areas of Health Care for Adolescents Who Desired To Increase Their Proficiency in Those Areas, 1985*

Areas	Specialties						Total	
	Family Practice		Internal Medicine		Pediatrics			
	No.	Percent†	No.	Percent†	No.	Percent†	No.	Percent†
Growth and development problems	18	29.5	3	6.7	7	23.3	28	20.6
Adolescent endocrinology	28	28.6	0	0	30	28.6	58	23.7
Acne	4	21.1	2	5.4	6	20.0	12	14.0
Obesity	9	27.3	2	5.1	9	21.4	20	17.5
Anorexia and/or bulimia	19	19.8	2	4.4	18	16.8	39	15.7
Sports-related injuries and health problems	12	38.7	2	4.3	37	36.3	51	28.5
Sexually transmitted diseases	4	21.1	3	8.1	11	21.6	18	16.8
Pregnancy diagnosis	1	7.1	0	0	4	10.5	5	5.5
Menstrual disorders	11	42.3	3	7.1	14	22.2	28	21.4
Alcohol and drug abuse assessment	20	37.0	2	4.9	28	31.1	50	27.0
Homosexuality	20	23.0	1	2.3	29	25.9	50	20.7
Family conflicts	20	35.7	0	0	22	35.5	42	25.6
Suicide risk assessment	16	24.2	3	6.3	26	29.9	45	22.4
School-based learning and/or behavior problems	36	38.3	2	4.2	14	24.1	52	26.0
Management of chronic illness	23	23.2	2	4.5	9	10.2	34	14.7
Depression	20	39.2	1	2.4	30	30.0	51	26.4
Birth control and/or family planning	3	17.6	0	0	16	22.5	19	14.7
Psychosomatic complaints	10	31.3	0	0	6	16.2	16	15.0
Delinquency	24	25.0	2	4.2	23	22.5	49	19.9

* Respondents were from a national, randomly selected sample of 751 specialists in family practice, internal medicine, and pediatrics.

† In each cell, the percentage was derived by dividing the number in the cell by the number in the corresponding cell in Table 1. For example, 29.5 percent of the family practice physicians desiring to increase their proficiency in the area of growth and development problems represented 18 (Table 2) of 61 (Table 1) physicians.

to those under 16 years, with older adolescents generally being admitted to adult medicine units. Additionally, 60 percent of pediatricians use age cutoffs to limit the number of adolescents in their practices (5).

Family physicians remain the primary providers of outpatient health care to youth. What becomes clear from the present survey is that, despite identified training and skill deficits, most physicians who provide health care to youth are reluctant to undertake continuing education to remedy the deficiencies. The present report indicates that, unless physicians' resistance to dealing with social, behavioral, and life-style morbidities is addressed in medical school, barriers to providing health care to adolescents will persist for physicians for the duration of their clinical practice. The increasing prevalence of these new morbidities will accentuate the poor fit between physicians' training and adolescents' health needs. The long-term consequence is that the gap between the health needs of adolescents and the skills of primary care providers may continue to widen.

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COMMUNICATIONS

Sources of Stress in Postgraduate Medical Training

Anita D. Taylor, Ann Sinclair, and Eric M. Wall, M.D.

Residency programs are often described as highly stressful environments. Studies of the stresses during the graduate medical training years have focused on identifying specific problems caused by the professional environment, such as lack of leisure time, feelings of ambiguity about professional and personal roles, feelings of inadequacy, and sleep deprivation (1, 2). In addition to work-related stress, people experience "life events—e.g. marriage, pregnancy, retirement—which necessitate adaptation by the individual" (3). Life events have been identified by Holmes and Rahe (4) as stressors that frequently require social readjustment. Whether the stresses during medical training are solely attributable to the work setting or are also related to life events has not been addressed in the literature.

The first year of residency has been characterized as the "weakest link in the entire chain of physician training" (5). Often, in response to specific crises, personal stress reduction and management programs have been developed for first-year residents (6–8). Alexander and colleagues (9), however, found that such support may be needed beyond the first year of the residency. They reported no significant differences on measures of personal and occupational stress among residents at each level in a three-year program.

In the study reported here, the authors sought to determine the patterns of life events during postgraduate medical training that might contribute to the stress residents experienced during that period.

Methods

In 1984 questionnaires were sent to all residency and fellowship program directors in Oregon for distribution to their house officers and fellows in all years of training. Seven life events were presented as items on the questionnaire: marriage, major geographic relocation, death in immediate family, birth of child, separation or divorce, unexpected increase in financial burdens, and major illness in family. In addition, 12 items were included that related to behavioral and attitudinal changes, for instance, increase in family conflict, decrease in social interaction, and self-doubt concerning choice of specialty. The questionnaire was developed through a Delphi process. The residents and fellows were asked to indicate which items had occurred during each of their years of training. Responses were recorded only as "occurred" or "did not occur." That is, if a respondent indicated that a particular event occurred more than once during a given year, the response on that item was scored only once for that year for that respondent.

Results

A total of 530 questionnaires were distributed, and 243 (45.8 percent) residents and fellows in a total of at least six different years of training returned the questionnaires. Most of the respondents were 35 years of age or less, most were males, and most were in their first three years of residency training. The numbers of respondents who were eligible to report on life events and behavioral and attitude changes in each of the postgraduate years were: first year, 243; second year, 195; third year, 133; fourth year, 68; fifth year, 31; and sixth year and above, 12.

All 243 respondents reported at least one event. The numbers of respondents reporting experiencing each of the seven life events were:

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For related editorial, see page 443.

"major geographic relocation," 196 respondents; "marriage," 138 respondents; "unexpected increase in financial burdens," 86 respondents; "major illness in family," 69 respondents; "birth of child," 67 respondents; "death in immediate family," 54 respondents, and "separation or divorce," 37 respondents.

The responses were examined for increases

TABLE 1

Number and Percentage of Residents and Fellows in Oregon Reporting Experiencing Major Life Events and Changes in Behavior and Attitudes, by Postgraduate Year (PGY) in Which Event or Change Occurred, 1984*

Events and Changes	PGY-1 ($n = 243$)		PGY-2 ($n = 195$)		PGY-3 ($n = 133$)		PGY-4 ($n = 68$)		PGY-5 ($n = 31$)		≥PGY-6 ($n = 12$)	
	No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.	Percent
Marriage	32	13.2	19	9.7	8	6.0	3	4.4	3	9.7	0	
Major geographic relocation	166	88.3	32	16.4	11	8.3	11	16.2	3	9.7	0	
Death in immediate family	14	5.8	11	5.6	3	2.3	2	2.9	2	6.5	1	8.3
Birth of child	17	7.0	18	9.2	18	13.5	10	14.7	4	12.9	0	
Separation or divorce	13	5.3	4	2.1	1	0.8	1	1.5	2	6.5	0	
Personal difficulty adjusting to schedule	86	35.4	27	13.8	10	7.5	12	17.6	2	6.5	0	
Family difficulty adjusting to schedule	74	30.5	29	14.9	11	8.3	6	8.8	2	6.5	2	16.7
Increase in family conflict	42	17.3	16	8.2	8	6.0	9	13.2	2	6.5	2	16.7
Major illness in family	23	9.5	19	9.7	15	11.3	5	7.4	0		1	8.3
Unexpected increase in financial burdens	39	16.0	21	10.8	12	9.0	14	20.6	5	16.1	1	8.3
Increased responsibilities of spouse or "significant other"	42	17.3	31	15.9	16	12.0	11	16.2	2	6.5	2	16.7
Decrease in social interaction	118	48.6	47	24.1	21	15.8	16	23.5	5	16.1	1	8.3
Significant change in eating habits	58	23.9	20	10.3	9	6.8	6	8.8	3	9.7	0	
Change in sleeping habits	128	52.7	47	24.1	24	18.0	6	8.8	3	9.7	1	8.3
Difficulty adjusting to work demands	63	25.9	19	9.7	6	4.5	10	14.7	2	6.5	1	8.3
Conflict with colleagues	9	3.7	4	2.1	4	3.0	4	5.9	3	9.7	1	8.3
Conflict with superiors	17	7.0	11	5.6	11	8.3	8	11.8	2	6.5	1	8.3
Self-doubt about choice of specialty	70	28.8	37	19.0	16	12.0	12	17.6	2	6.5	2	16.7
Concern about future	66	27.2	52	26.7	44	33.1	27	39.7	10	32.3	4	33.3

* A total of 530 questionnaires were distributed in all residency and fellowship programs in Oregon in all years of postgraduate medical training, and 243 residents and fellows in a total of at least six different years of training responded. The numbers given for each postgraduate year (PGY) above refer to the respondents who were eligible to report on life events and behavioral and attitudinal changes in the respective PGY. If a respondent indicated that a particular item occurred more than once during a given year, the item was recorded only once for the year for that respondent.

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Comparison of Mood Changes and Satisfaction Among First-Year Medical Residents in Three Programs

Geoffrey H. Gordon, M.D., Donald E. Girard, M.D., and David H. Hickam, M.D.

Studies of residents' mood changes during the first year of training have documented the occurrence of various dysphoric states, including depression, fatigue, anger, and dissatisfaction (1–7). Because these studies have used different methodologies and examined individual training programs, the generalizability of the findings is unknown. In the present study, which was conducted in three separate internal medicine training programs, the authors compared mood changes and satisfaction among the residents and developed a measurement instrument relevant to clinical training.

Materials and Methods

Mood changes are commonly evaluated using adjective rating lists such as the Profile of Mood States (POMS), a 65-item, 5-point instrument of known validity and reliability (8). The POMS yields scores on six mood factors and has been used to study emotional changes during the residency (2, 3). However, it requires considerable time to complete and does not address certain emotions relevant to the residency, such as feelings of mastery and achievement. To overcome these obstacles, the present authors developed a 14-item, self-administered rating list of emotion descriptors relevant to the residency experience. Three groups of residents were asked to rate their current agreement or disagreement with each descriptor on a Likert-type scale in which 1 represented strong agreement and 5 represented strong disagreement.

This descriptor list and the POMS were administered to the 36 first-year internal medicine residents in the University of California, Irvine, Program B at the Veterans Administration Medical Center, Long Beach, six times during the 1982–83 year: at residency orientation and 1, 3, 6, 8 and 11 months into training. Principal components analysis (9) was applied to the responses to group the 14 items into mood scales that could be examined statistically. These mood scales were compared with the six POMS mood factors by use of bivariate correlation analysis. In the next phase of the study, the 14-item instrument was given to two additional groups of residents in different training programs, and these data were analyzed using the mood scales derived from the Long Beach data. The 14-item instrument was given to the 25 first-year internal medicine residents at the Oregon Health Sciences University (OHSU) and to the 13 first-year internal medicine residents at the Good Samaritan Hospital and Medical Center in Portland, Oregon. These residents completed

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Ratings of Residents' Clinical Competence And Performance on Certification Examination

John J. Norcini, Ph.D., George D. Webster, M.D., Louis J. Grosso, Linda L. Blank, and John A. Benson, Jr., M.D.

Abstract—The American Board of Internal Medicine (ABIM) requires directors of internal medicine residency programs to rate their residents in overall clinical competence and its essential components. In the study reported here, the authors investigated the relationships among these ratings and compared them with the residents' performance on the ABIM's certification examination in the years 1980 through 1985. The ratings of the individual components of clinical competence were correlated moderately with examination performance and very highly with each other. The individual components that were less dependent on medical knowledge (for example, interpersonal skills or humanism) had slightly smaller correlations with examination performance. The ratings of overall clinical competence were also related moderately to examination performance. Changes in the pattern of the ratings over time indicated that fewer candidates were receiving lower ratings while more were receiving higher ratings. The pass rates for each rating level were the same or lower; for example, the pass rate for candidates rated 5 was 68 percent in 1980 and 56 percent in 1985. The similar ranking of examinees by the program directors and the examination provides evidence for the validity of the examination.

To assure that certification in internal medicine is as comprehensive as possible, the certification process includes assessments of a candidate's skills in all the components of competence the American Board of Internal Medicine (ABIM) has deemed essential. These components are clinical skills, interpersonal skills, humanistic qualities, attitudes, medical knowledge, ethics, and clinical judgment. Directors of internal medicine residency programs are required to assess these skills in their residents, and their judgments determine residents' admission to the internal medicine certifying examination. To assist program directors in their judgments, the ABIM established in 1972 its Clinical Competence Program, which recommends continuing assessment by multiple observers, recommends types of rating forms and procedures, and monitors the assessment process by regularly scheduled visits to all residency programs by representatives of the ABIM (1).

The research for the present study was supported by the American Board of Internal Medicine (ABIM), Philadelphia, Pennsylvania.

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The written certification examination focuses on the evaluation of knowledge and clinical judgment. The ABIM continually studies the examination's validity and closely monitors the comparability of certification standards from year to year. In the absence of a single standard, these studies have employed a number of different external criteria and include program directors' ratings of the clinical competence of their residents. While the ratings were designed and continue to be used for admission to the examination, they have proven useful in monitoring the comparability of the certification standards. As part of this latter use, the stability and comparability of the ratings are important considerations, and the ABIM has studied trends in the evaluations of the components of competence and the relationships of the components to each other and the examination. In the study reported here, the authors compare program directors' ratings with examination performance for the candidates who took the certifying examinations in the six years from 1980 through 1985.

Methods

Directors of internal medicine residency programs submit evaluations of their residents' overall clinical competence and its components to the ABIM after the residents apply to take the certification examination. These evaluations are made on a 9-point rating scale. Overall competence ratings of 1 to 3 are considered "unsatisfactory," 4 to 6 are "satisfactory," and 7 to 9 are "superior." Candidates with ratings of less than 4 are not permitted to take the examination and, consequently, were not included in the present study. The study was further restricted to candidates who took the examination in the years 1980 through 1985 for the first time and in the year they finished training. For candidates who received training in more than one program, the program director's rating for the third year of training was used. A total of 26,950 candidates comprised the sample studied.

The examinations consisted of patient management problems and three types of multiple-choice questions. After scoring, the mean of the "reference" group (all first-time takers of the examination who graduated from U.S. or Canadian medical schools and recently completed three years of training in an approved residency program) was 500 with a standard deviation of 100. Details of the scoring process can be found elsewhere (2, 3). The passing level was set at 400, which is one standard deviation below the mean score of the reference group.

Analyses include comparison of the program directors' ratings of the candidates' overall clinical competence, clinical skills, interpersonal skills, humanistic qualities, attitudes, medical knowledge, and clinical judgment with the candidates' examination performance.

Results

Table 1 presents the number and percentage of the candidates who received each rating (4 through 9) for overall clinical competence. Inspection of these data revealed a normal distribution of ratings within each year; that is, very few candidates received the extreme ratings of 4 and 9, while most received ratings of 6 and 7.

The percentages of candidates receiving ratings of 6 and 9 (the highest ratings of satisfactory and superior, respectively) remained fairly stable across the six years, while the percentages of candidates receiving ratings of 4 and 5 dropped, and the percentages of candidates receiving ratings of 7 and 8 rose. These data indicate that overall the 1984 and 1985 can-

TABLE 1

Numbers and Percentages of 26,950 Candidates for the Certification Examination of the American Board of Internal Medicine (ABIM) at Each Level of Rating of Overall Clinical Competence by Their Residency Program Directors, 1980 Through 1985

Rating*	1980		1981		1982		1983		1984		1985	
	No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.	Percent
9	222	5	272	6	264	6	276	6	263	6	232	5
8	773	18	720	16	733	17	763	16	856	19	845	19
7	978	22	1,042	23	1,031	24	1,094	24	1,355	30	1,332	29
6	1,349	31	1,371	31	1,268	29	1,283	28	1,225	27	1,333	29
5	779	18	820	18	792	18	888	19	661	14	638	14
4	243	6	275	6	286	6	316	7	175	4	197	4
Total	4,344	100	4,500	100	4,374	100	4,620	100	4,535	100	4,577	100

* The directors used a 9-point rating scale. These ratings are broken into three categories: superior = 7–9, satisfactory = 4–6; unsatisfactory = 1–3. The ABIM does not permit residents with ratings lower than 4 to take the examination.

didates received higher ratings than the candidates in 1980–1983. Specifically, more of the 1984 and 1985 candidates were rated 7 and 8, while fewer candidates received ratings of 4 and 5 compared with the candidates in 1980–1983. The average rating increased from 6.4 in each of the first four years to 6.6 in both 1984 and 1985.

Figure 1 presents the pass rates for the candidates at each level of rating of overall competence for each year of the study. These pass rates ranged from an average of 46 percent for those candidates receiving a rating of 4 to an average of 93 percent for those candidates receiving a rating of 9. This finding indicates that the program directors and the examinations rank candidates in a similar way despite differences in what is assessed. The examination measures medical knowledge and clinical judgment, while the program directors' ratings of overall clinical competence include these skills plus the other components of competence.

The pass rates for candidates rated superior (ratings of 7, 8, or 9) were relatively stable across the six years, varying no more than 3 percent from year to year. There was much more fluctuation, however, in the pass rates of those rated satisfactory (ratings of 4, 5, or 6). The pass rates varied as much as 13 percentage points (ratings of 4 between 1981 and 1984) across the six years of the study, with a decreasing pass rate within each rating being the general trend.

Despite these differences in pass rates, the examination scores of the different rating groups showed considerable overlap—that is, the range of scores received by candidates in a particular rating group overlapped the scores received by candidates in higher and lower rating groups. For example, in 1984 when differences in the pass rates for the rating groups were largest, the average examination score plus or minus one standard deviation for those rated 9 was 449 to 633, for those rated 6 it was 343 to 575, and for those rated 4 it was 236 to 484. Similar overlaps occurred in all other years of the study.

Correlations between the candidates' examination performance and the program directors' ratings of each component of competence were also calculated for the 1985 candidates. The correlations were .37 for clinical judgment, .41 for medical knowledge, .34 for history-taking skills, .36 for physical examination skills,

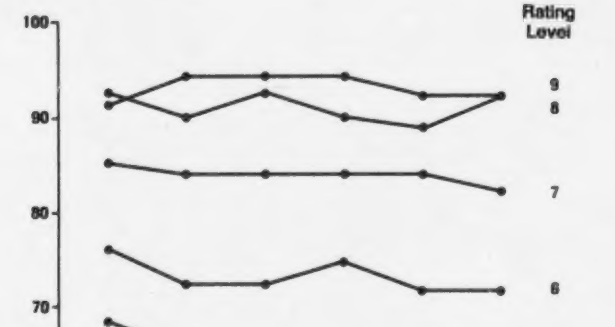

FIGURE 1

Percentage of candidates passing the certification examination of the American Board of Internal Medicine at each level of rating of overall clinical competence (rated on a 9-point scale in which superior = 7–9; satisfactory = 4–6; unsatisfactory = 1–3) by their residency program directors, 1980 through 1985 (residents with unsatisfactory ratings not allowed to take the examination).

.31 for procedural skills, .35 for medical care, .22 for attitudes, and .19 for humanistic qualities. Thus, both knowledge and clinical judgment had modest relationships with examination performance, and the clinical skills and medical care correlations were almost as large.

The relatively low correlations between the examination scores and ratings of attitudes and humanistic qualities might indicate that they measure an aspect of competence unrelated to the other components. However, the correlations among components were very high (average of .77), and a more sophisticated statistical analysis—factor analysis—indicated that one trait (general competence) explains the vast majority of the variance in all seven ratings.

Discussion

The data reported here indicate a reassuring pattern of relationships between all program directors' ratings of competence and examination performance on the certification examination because the results provide evidence for the validity of the examination. The ratings of the individual components of clinical competence were correlated moderately with examination performance and correlated very highly with each other. The individual components that were less dependent on medical knowledge (for example, interpersonal skills or humanism) had slightly smaller correlations with examination performance. It may be that all the components of competence are developed to the same level by the end of training or that there is only one trait—overall competence—that is reflected in the assessment of each component. Otherwise, the high correlations among the ratings of the individual components of competence suggest a "halo" effect in which a program director's general impression of a candidate accounts for all the ratings the director assigns.

Ratings of overall clinical competence were also moderately related to examination performance. Changes in the pattern of the ratings over time, however, indicate that fewer candidates in 1984 and 1985 received the lower ratings of 4 and 5, while more received higher ratings of 7 and 8, compared with the candidates in 1980 through 1983. Moreover, the pass rates for all levels of rating remained the same or dropped during the six years. The dropping pass rates may signal changes in the standards of the certifying examination, a more qualified resident population, or shifts in the standards of program directors.

Changes in the standards of the certifying examination were not likely to account for these trends, since the pass rates for other groups used to monitor standards (for instance, candidates from better programs or repeat takers of the examination) did not change consistently over the period of the study. The trend of higher program directors' ratings could reflect higher quality residents, but the falling examination scores for the lower-rated residents do not support this explanation. Most likely, there was a shift in the standards of the program directors. Factors contributing to such a shift might include the inherent conflict of interest in program directors' ratings of their own residents (that is, their desire to see their residents do well) and the directors' fear of litigation and reluctance to record negative evaluations. These factors have been identified during the ABIM representatives' visits to individual programs, according to unpublished reports of the Hospital Visit Program of the American Board of Internal Medicine.

If the changes in the ratings reported here are due to shifts in program directors' standards, the ratings may retain their usefulness as a criterion for entrance to the ABIM's certification examination but might be less useful as a criterion against which to judge the examination. In order to provide more support to program directors and to convey better its standards, the ABIM is developing definitions and procedures to assess the clinical competence of residents better.

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Debt, Moonlighting, and Career Decisions Among Internal Medicine Residents

Rebecca A. Silliman, M.D., Ph.D., Robert S. Dittus, M.D., Ramon Velez, M.D., Steven A. Wartman, M.D., Ph.D., Mark J. Young, M.D., and Robert H. Fletcher, M.D.

Abstract—In the study reported here, medical residents were surveyed to determine their patterns of educational indebtedness, the effects of debt on their decisions about training and career, the frequency with which they begin making loan payments during training, the extent to which they moonlight and the reasons for doing so, and their opinions about the effects of moonlighting on house staff training. A total of 223 residents from four residency programs were surveyed; 181 responded. Most (86 percent) had educational debt (mean = $20,500), and more than half of those with debt were making loan payments. Forty percent of the residents moonlighted, and moonlighting was related to the presence of educational debt, monthly loan payments, and number of dependents.

The average tuition at U.S. medical schools has more than tripled in the past 10 years (1), while sources of financial assistance have declined (2). As a result of both trends, medical students are accruing ever greater debts and are relying more heavily on loans with higher interest rates (for instance, loans under the Health Education Assistance Loan Program) than previously (2). The average educational debt of graduating senior medical students is increasing by $2,000 to $3,000 per year (2). By 1986 this debt amounted to $27,493 among the graduates who participated in the Association of American Medical Colleges' (AAMC) annual graduation survey. When responding graduates without any debt were excluded from analysis, this figure rose to $33,499.*

Increasing indebtedness may influence the specialty choices of young physicians (1–3), and it may affect their graduate medical education by serving as an additional source of stress (4). Although it is widely known that many house officers moonlight to earn extra money, the extent to which moonlighting has become a necessity because of educational debt is not known.

Information about the relationship between educational debt and moonlighting is emerging (5–7). French (5) studied the

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* Personal communication, Cynthia Tudor, Ph.D., graduation questionnaire coordinator, Association of American Medical Colleges, Washington, D.C., October 22, 1986.

financial indebtedness of residents and fellows at the University of Michigan Hospital. She found that three-quarters of the trainees with debts over $20,000 wanted to moonlight, although few actually did so. The trainees with greater indebtedness more often reported that they had considered interrupting their training in order to make money to retire their debts.

The American Medical Association's 1979 survey of resident physicians also examined the relationship between educational debt and moonlighting among 3,403 residents nationwide (6, 7). Indebted residents were more likely to moonlight than residents without debt, and moonlighters had higher educational debts than did nonmoonlighters. However, when only those residents with debt were considered, the average educational debt of moonlighters was no greater than that of nonmoonlighters.

Although moonlighting is an important issue in graduate medical education, there is little objective or subjective information about its impact on house staff education (8). In an effort to understand how residents perceive moonlighting, Banahan and his colleagues (8) surveyed graduates of two family medicine residencies and found that they felt moonlighting had enhanced their training.

In the study reported here, internal medicine residents were surveyed to determine the patterns of their educational indebtedness, the effects of debt on their decisions about training and career, the frequency with which they begin making loan payments during training, the extent to which they moonlight and the reasons for doing so, and their attitudes about the effects of moonlighting on their training.

Methods

A total of 223 second- and third-year internal medicine residents at four academic medical centers were surveyed between February and May 1984. The four centers were chosen because they were located in different regions (Rhode Island, North Carolina, Michigan, and Texas) and in both metropolitan and small-city areas and because they were willing to participate in the study. Three of the centers were state-supported, and one was private.

The directors of the residency programs provided information about characteristics of the residents in their programs: the total number of second- and third-year residents in training, their annual salaries, and their race and sex distribution. At the directors' request, the authors of the present paper agreed to keep the identity of the centers confidential.

The study was confined to second- and third-year internal medicine residents to reduce the influence of factors such as stage in training and specialty, since these factors are known to influence the probability of moonlighting (7). One author supervised data collection at each site. All information was collected and coded in a manner to ensure residents' anonymity.

The residents were asked to complete a 44-item questionnaire that the authors developed, assisted by their internal medicine colleagues, including recent residency graduates. The questionnaire asked for information about the residents' demographic characteristics (age, marital status, number of dependents, type of residence, and type of undergraduate and medical school attended); the amount of their educational debt; how they met loan payments; their moonlighting behavior and its relationship to debt and other factors; the attitudes of moonlighters about the impact of moonlighting on their training; and the influence of debt on their decision-making about further training and career choices.

How residents met loan payments was

assessed by a checklist of potential resources. Perceptions about the need to and reasons for moonlighting were elicited by questions with Likert-type responses. Finally, attitudes about moonlighting and the impacts of educational debt on career and training were sought through open-ended questions.

Student's *t*-test was used to compare the means of continuous variables in two groups, such as the mean educational debt of those attending private and public medical schools and of moonlighters and nonmoonlighters. Chi-square analysis was used to evaluate the statistical significance of associations between two dichotomous variables, for example, between whether residents moonlighted or not and whether they had or did not have educational debt. Finally, correlation coefficients assessed the relationship between two continuous variables, for instance, hours per month spent moonlighting and total educational debt.

Results

Three of the surveyed programs each trained 47 or 48 second- and third-year residents each year, and the fourth trained 81. The second-year residents earned an average annual salary of $19,567 (range: $17,867–$21,603), while the third-year residents earned $20,584 (range: $18,533–$22,593). Seventy-three percent of the residents were male, and almost all (97 percent) were white.

Of these 223 internal medicine residents, 181 (81 percent) returned the questionnaire. Of these, 97 percent were white, 66 percent were male, and 56 percent were married. There were no statistically significant differences in race or sex between respondents and nonrespondents.

Of those who responded, 56 percent had attended private medical schools, 42 percent had attended state-supported schools, and 2 percent were graduates of foreign medical schools. Similar percentages were reported for the types of undergraduate schools attended (57, 41, and 2 percent, respectively).

Most of the residents (86 percent) had educational debt, which averaged $20,500 and ranged from $800 to $80,000. There was no statistically significant difference in debt level between those who had attended private and public medical schools ($20,922 versus $20,208, respectively, $p = 0.75$). Although 23 percent reported having debt from their premedical education, the amount represented only 8 percent of their total debt.

Of the 155 residents with debt, 41 (23 percent) reported that their debt had influenced either training or career decisions. This response was given more frequently by those entering practice than by those planning to enter fellowships (38 percent versus 18 percent, $p = 0.004$). For example, of the 41, more than half (54 percent) felt that fellowship training was not an option for them, either because they had a service commitment to fulfill after residency (such as the National Health Service Corps) or because of the need to make a high salary as soon as possible. In contrast, a few (12 percent) stated that subspecialty training would allow them to enter a more lucrative practice. A similar percentage felt that they could not afford to enter academic careers because of their large debts and the comparatively lower salaries for academic positions.

Asked to describe their plans following residency, 61 percent said that they would be entering fellowships or other training, 26 percent anticipated entering private practice, 10 percent had service commitments to fulfill, and 3 percent were undecided.

More than half of the residents with debt (57 percent) had already begun making loan payments against their debt. Their mean monthly debt payment was $116 (range: $15–$425). Approximately half of those who made loan payments paid less than $100 each month, 35 percent paid between $100 and $200, and 14 percent paid more than $200 each month.

Forty percent ($n = 72$) of the respondents moonlighted, averaging 30 hours per month (range: 3–108 hours). Half of these residents moonlighted more than 24 hours per month. Seventy-four percent of those who moonlighted said that it was either very essential or somewhat essential that they do so. The most frequently cited reason for moonlighting, reported by 92 percent, was to make extra money to pay for otherwise unaffordable items. Other reasons included the need to earn extra money to meet everyday expenses (reported by 65 percent) and the enjoyment and educational value of moonlighting (reported by 64 percent). Fifty-seven percent of the moonlighters making loan payments reported that they moonlighted to earn money to make payments against their educational debts.

A greater proportion of moonlighters had educational debt and monthly loan payments than did nonmoonlighters (Table 1). However, among those with educational debt or monthly loan payments, there was no significant relationship between the number of hours spent moonlighting per month and either total educational debt or monthly loan payment. Furthermore, the average total debt of moonlighters and nonmoonlighters was similar ($21,132 versus $20,025), as was their average monthly loan payment ($119 versus $113).

Moonlighters were also more likely to have dependents than nonmoonlighters (Table 1). As the number of dependents increased, so did the tendency to moonlight. Approximately one-third of the residents with no dependents moonlighted, while almost two-thirds of those with more than one dependent did so.

Sixty-eight percent of the residents who moonlighted, responding to a yes-no question, reported that moonlighting had affected their residency training. In answering subsequent open-ended questions, many of these residents noted both positive and negative effects (Table 2). Seeing a broader spectrum of patients was the most frequently cited positive effect,

TABLE 1

Numbers and Percentages of Moonlighters and Nonmoonlighters with Three Characteristics Among 181 Second- and Third-Year Residents at Four Academic Medical Centers, 1984*

Characteristics	Moonlighters ($n = 72$)		Nonmoonlighters ($n = 109$)		p
	No.	Percent	No.	Percent	
Had educational debt	67	93	88	81	0.02
Made loan repayments while in residency	43	60	46	42	0.02
Had dependents	40	56	37	34	0.004

* The academic medical centers were in Rhode Island, North Carolina, Michigan, and Texas. Three were state-supported, and one was private; two were in large metropolitan areas, and two were in small cities.

and other positive aspects reported were achieving a better understanding of the private practice of internal medicine, mastering technical skills (for example, suturing or intubation), and having the opportunity to practice independently outside the academic setting. The most frequently reported negative effect of moonlighting was having less time for reading or participation in other educational aspects of the residency program. Other negative effects reported were increased fatigue and having less time for family, hobbies, and community activities.

Discussion

The high response rate (81 percent) and apparent lack of significant differences between respondents and nonrespondents suggest that the study findings are not biased by the absence of information about nonrespondents. The respondents' personal and educational backgrounds were similar to those of internal medicine residents nationwide (9), and they had educational debt levels very similar to the national average for senior medical students reported by the Association of American Medical Colleges (10). Thus, they apparently were comparable to residents in other training programs. Of course, there may be important differences between them and their peers who chose careers in higher paying specialties, and this issue needs to be addressed by researchers.

TABLE 2

Percentages of 49 Moonlighting Second- and Third-Year Residents at Four Academic Medical Centers Who Reported Positive and Negative Effects of Moonlighting on Their Training, 1984*

Effects	
Positive effects	
Broader range of patients	76
Better understanding of private practice	18
Increased technical skills	8
Independence in practicing	8
Negative effects	
Decreased reading time	39
Increased fatigue	24
Less time for family	20

*Of 181 respondents, 72 reported that they moonlighted; of those who moonlighted, 49 reported that moonlighting affected their training. These 49 residents responded to open-ended questions about positive and negative effects; their responses were arranged into four categories of positive effects and three categories of negative effects. The residents were at academic medical centers in Rhode Island, North Carolina, Michigan, and Texas. Three centers were state-supported, and one was private; two were in large metropolitan areas, and two were in small cities.

More than half of the residents with educational debt in the present study were making loan payments during their training. For some, these payments represented about one-third of their take-home pay. Residents' salaries are unlikely to increase substantially over the next few years, especially given the financial pressures faced by academic medical centers. This assumption is supported by data from the 1983 survey of house staff stipends, benefits, and funding done by the AAMC's Council of Teaching Hospitals (11). Since 1981–82 the annual percentage of salary increase has progressively declined. Furthermore, Schleiter and Tarlov (12) estimated that residents' salaries actually diminished 30 percent, in 1983 dollars, between 1976–77 and 1983–84.

Residents will probably face even greater monthly loan payments in the future because of rising medical school tuition costs, the diminished availability of government financial aid programs with service as a repayment option, and the increasing need to take high interest loans (for example, loans under the Health Education Assistance Loan Program) (2). Many residents may not be able to manage payments from their residency salary alone, and they will be forced to rely to a greater extent than at present on other sources of income, such as moonlighting. The need to moonlight may be particularly true for residents from poor backgrounds.

Forty percent of the residents in the present study moonlighted, and this figure is similar to that reported by Weil and colleagues (13) in a national study of internal medicine manpower. Among residents with educational debt in the present study, no statistically significant differences in amount of debt were observed between moonlighters and nonmoonlighters. However, the residents with no educational debt were less likely to moonlight than those with debt, a finding that suggests that the perception of debt rather than the actual amount of debt plays a role in the decision to moonlight. The extent to which ever-increasing debts and decreasing opportunities for lucrative practice following training will affect these patterns is not known but deserves close scrutiny.

The residents were also more likely to moonlight if they had dependents to support. Thus, perception of family responsibilities with attendant financial obligations appears to be another important determinant of the decision to moonlight. Other personal, life-style factors (such as wanting to own a home or boat or needing a new car) that also contribute to residents' decision-making about moonlighting could not be identified by the questionnaire.

Few investigators have asked house officers about the effect of moonlighting on their training (8). The residents in the present study gave candid responses when asked about this. While they reported negative effects (fewer opportunities for reading about clinical problems, more fatigue, and less time for family), they also reported positive effects. The negative effects raise questions about the effects of moonlighting, not only on the quality of patient care provided and the quality of teaching done by these residents but also on the quality of their family lives. On the other hand, the positive aspects reported by the residents suggest that moonlighting provides experiences not otherwise available in training programs. It could be argued that the perceived benefits of moonlighting were merely rationalizations on the part of the residents. However, perhaps training programs should examine actively and openly the role of moonlighting in house staff education. Do residents who moonlight learn important ambulatory clinical skills, albeit in unsupervised settings?

While the present study was not specifically designed to assess the impact of educational debt on residency training objectively, the fact that those residents with debt were more likely to moonlight and that almost one-quarter of them reported that their debt had influenced either training or career decisions suggests that this issue deserves further attention. McCue (4) has voiced concern about the relation between debt and training or career decisions. The issue was discussed by Dr. Carol Landau (Brown University Program in Medicine) and colleagues in their paper, "Stresses and Supports During Residency Training," presented at the 1984 Conference on Research in Medical Education of the AAMC. They reported an association between financial indebtedness and stress among internal medicine residents.

Perhaps as the magnitude of debt increases, so will its effects. In light of this possibility, several points are worth emphasizing. First, the average educational debt of graduating senior medical students is increasing (2). Second, a majority of house officers are repaying growing debt using salaries that will probably remain fairly constant or even decrease in real dollars over the next several years. Third, as debt and repayment pressures mount, so will the pressures to earn more money. These pressures may be accentuated by the increasing competition for patients and the growing efforts to control health care expenditures.

In the present authors' opinions, attention should be given to the implications of increasing educational debt for postgraduate medical training. Not only are alternative funding mechanisms needed, such as privately financed loan programs for medical students (14), but also trainees need sound financial counseling. If moonlighting is to be accepted as a necessity for many house officers, residency programs must create supervised moonlighting opportunities that complement the educational experiences of their trainees. Such opportunities would decrease the financial pressures faced by house officers while at the same time broadening their ambulatory training.

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Effect of History of Psychological Counseling On Selection of Applicants for Residencies

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Abstract—The stress of medical education and its consequences are widely recognized and acknowledged. However, many students may be reluctant to seek help for stress-related problems because they are concerned over the ramifications such a decision may have on their career opportunities. The purpose of the present study was to determine the extent to which an applicant's history of having received psychological counseling for stress-related problems influenced residency program directors' perceptions of such applicants seeking admission to residency programs. Five hundred twenty-three residency directors in six medical specialties (pediatrics, internal medicine, family medicine, psychiatry, obstetrics and gynecology, and surgery) rated a hypothetical residency applicant. The student's gender and history of psychological counseling were manipulated, but their basic qualifications remained constant. The directors rated the likelihood that they would invite the student for an interview and accept the applicant for the residency. Analysis of variance showed that the directors in pediatrics, family medicine, and psychiatry viewed the hypothetical applicant more favorably overall than directors in internal medicine, obstetrics and gynecology, and surgery. The program directors rated female applicants more favorably than their male counterparts and had a strong bias against inviting for an interview or accepting into their programs students who had a history of psychological counseling. Implications of these findings are discussed.

The process of becoming a physician is a stressful experience for many students. Course work requirements, examination schedules, long and inflexible work hours, students' fear of failure, and few short-term rewards have been identified as some of the stressors in medical education (1–3). Several authors (4–6) have described the psychological difficulties that may occur in response to these stressors. Depression, anxiety, low self-esteem, psychophysiologic disorders, and problems in interpersonal relationships are a few of the problems frequently identified in medical students (4). Some research has suggested that female students may encounter greater difficulty than their male counterparts (5). For some students, the stress of medical education is of sufficient severity for them to seek professional help. Estimates indicate that approximately 15 percent of medical students receive counseling and/or therapy (4).

Although the stress of medical educa-

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tion and its consequences are widely recognized and acknowledged, many students may be reluctant to seek help for stress-related problems due to concern over the possible ramifications such a decision may have on future career opportunities. First-year residency positions are becoming increasingly competitive (7), and a student's admission of having had difficulty coping with the stress of medical school may decrease that student's attractiveness as a residency candidate. Program directors in psychiatry, for example, ranked psychological stability as the most important personal variable in selecting a prospective resident (8). Similarly, Wagoner and colleagues (9) reported that "hints of underlying problems" in a dean's letter was a significant factor in determining whether a candidate would be invited for an interview. It is pertinent, then, to inquire about the attitudes residency training directors have with respect to students who seek help in coping with difficulties that result from the stress of medical education. Are these students less likely to be invited for an interview or accepted for a residency position than similar students who have not sought help? The authors' primary purpose in the present study was to determine the extent to which psychological counseling for stress-related problems influences program directors' decisions to invite an applicant for an interview and to accept him for a residency position.

Method

Directors of residency training programs in six medical specialties—pediatrics, family medicine, internal medicine, obstetrics and gynecology, psychiatry, and surgery—were chosen for the study. The names of 200 directors in each specialty (total sample = 1,200) were selected randomly from the *1984–85 Directory of Residency Training Programs* published by the American Medical Association (10). This sample size was determined to be sufficient for detecting differences among specialties.

A one-page candidate summary description (CSD) describing the basic characteristics of a hypothetical residency applicant was developed by the present authors and sent to the training directors in 1985. In order to mask the true purpose of the study, a cover letter was enclosed that described the intent of the survey as a way of testing a new method of ranking applicants. The CSD contained a summary of the student's medical school transcripts and records, letters of recommendation, and stated career plans. The summary was written in such a manner as to convey an average student. The basic description of the applicant was held constant, but gender and history of psychological counseling were not. The applicant's sex was indicated by the applicant's name (that is, Allen or Ellen Smith) on the CSD. The following statement was inserted in the CSDs of those described as having received psychological counseling: "It was noted that Mr. (or Ms.) Smith received psychological counseling to help cope with the interpersonal difficulties arising from the stress of medical education." The four possible combinations of the hypothetical applicant were distributed equally among residency directors in each medical specialty.

The directors were instructed to read the CSD and then rate the likelihood on whether to invite the applicant for an interview and whether to accept the student for the residency. The rating was indicated by placing a slash mark on a line that connected the bipolar phrases invite–do not invite and a line for accept–reject. Each line was exactly 100 millimeters in length. The directors' ratings were scored by measuring the position of the slash within the range 0 to 100, with 0 indicating do not invite or do not accept and 100 indicating invite or accept.

The applicants' gender, history or absence of psychological counseling, and medical specialty (pediatrics, internal medicine, family medicine, obstetrics and gynecology, psychiatry, and surgery) were the independent variables. The dependent variables were the ratings on inviting and accepting the applicant. The data were analyzed by a three-way analysis of variance.

Results

Of the 1,200 CSDs mailed to residency program directors, 23 were undeliverable and returned by the post office, and 526 were returned by the directors. Three of these were filled out incorrectly and omitted from analyses. The total sample analyzed was 523 (44 percent). Some directors failed to rate the applicant on both variables; thus, the sample size for some analyses is smaller than the total number that responded to the questionnaire.

Means and standard deviations of the directors' ratings are given for specialty, gender, and history of psychological counseling in Table 1. Analysis of variance showed that the decision to invite for an interview differed significantly by specialty ($F = 13.99$, $p < .001$). The directors in pediatrics, family medicine, and psychiatry viewed the hypothetical applicant more favorably, regardless of gender or history of psychological counseling,

TABLE 1

Mean Scores given by Program Directors to Hypothetical Applicants for Residency Positions, by Specialty of the Rater's Program and by Gender and History of Psychological Counseling of the Applicant, on Inviting the Applicant for an Interview and Accepting the Applicant into the Residency, 1986*

Variables	Scores					
	Invite to Interview			Accept into Residency		
	No.	Mean Score†	S.D.	No.	Mean Score‡	S.D.
Specialty of program						
Pediatrics	81	54	23	84	41	20
Family practice	115	55	22	114	45	20
Psychiatry	60	56	22	65	45	20
Internal medicine	66	40	28	67	34	24
Obstetrics/Gynecology	80	39	26	82	31	20
Surgery	78	38	24	76	33	19
Gender of applicant						
Male	259	46	24	256	36	20
Female	221	50	27	232	41	22
History of counseling of applicant						
With	235	44	24	236	36	20
Without	245	51	26	252	41	21

* Each of the 523 responding directors evaluated a hypothetical applicant described in a one-page synopsis of the applicant's medical school performance. The applicant's gender and history or absence of psychological counseling varied, but the other variables remained the same in the synopsis sent to different directors.

† Range = 0 (do not invite for interview) to 100 (invite for interview).

‡ Range = 0 (do not accept into program) to 100 (accept into program).

than the directors in internal medicine, obstetrics-gynecology, and surgery. The same difference was found on the decision to accept the applicant into the residency training program ($F = 8.46$, $p < .001$).

Acceptance into the residency program was significantly affected by gender ($F = 6.25$, $p < .01$). The female applicant was perceived more positively than the male applicant by the directors. With respect to inviting the student for an interview, there was a trend for the female to be more highly favored than the male ($F = 2.99$, $p < .10$), but the difference was not statistically significant.

A history of psychological counseling was found to affect both the decision to invite the applicant for an interview ($F = 11.75$, $p < .001$) and the decision to accept the applicant into the residency program ($F = 7.06$, $p < .01$). The program directors were less inclined to invite for an interview and more inclined to reject applicants with a history of psychological counseling than those without such a history.

Discussion

A bias against residency applicants with a history of psychological counseling was demonstrated in this study, as program directors were less likely to invite them than the other applicants for an interview or accept them into their programs. The results suggest that an otherwise qualified applicant may be eliminated from consideration if decision-makers determine early in the application process that the applicant has received psychological counseling. Given the importance of the interview in selecting prospective residents (9), students with a known history of psychological counseling may be particularly disadvantaged in that they may be denied the opportunity to explain the nature of their difficulty or prove that they are academically and clinically qualified for the position for which they are applying.

Program directors may believe that persons who had problems in their interpersonal relationships while in medical school may demonstrate similar difficulties during the residency and thus be "problem" residents. However, there are no published data to support this notion or the idea that these students will perform less well than their counterparts who did not have such difficulties. As suggested by their reluctance to accept students with a history of stress-related problems, program directors may assume that stress reactions are personality traits. Research has indicated, however, that the relationship between stress and how an individual copes with it is influenced by the specific parameters of the stressful situation (11). Thus, there may be little relationship between stress-related problems in medical school and performance in residency.

Because knowledge about a student's psychological history may jeopardize chances for acceptance into a residency, additional research is needed to help students make decisions about counseling. At present, there are little empirical data to which students can refer in making a decision about whether to seek counseling or about how much and what type of personal information to disclose during the residency selection process. In order to learn why students who receive psychological counseling are less desirable than those who do not receive counseling, future studies might determine whether program directors attribute negative personal characteristics to them. In addition, future research might address whether a history of counseling biases program directors against medical students with characteristics shown to be important in candidate selection, for example, performance as an extern in the program director's institution, honors in clinical clerkship, and membership in Alpha Omega Alpha (12).

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DATAGRAM

Results of the NRMP for 1987

The number of U.S. seniors who enrolled in the National Resident Matching Program (NRMP) in 1987 decreased by 252 from a year ago (1) and was 450 less than in 1985 (2). The number who subsequently withdrew increased slightly (Table 1), and the number of active applicants decreased by 271. The number who were unmatched decreased by 111.

The total number of U.S. and Canadian citizens (consisting of U.S. seniors, "fifth pathway" students, physician candidates [earlier U.S. graduates seeking a position in graduate medical education], and osteopathic and Canadian graduates but excluding U.S. foreign medical graduates [FMGs]) who applied to the match this year decreased by 126. Among the other U.S. and Canadian citizens, the number of "fifth pathway" applicants decreased from 305 to 210; 170 participated in the match, and 83 percent were successful. The number of graduates of osteopathic schools who initially applied to the match increased by 14 percent to 884, a three-fold increase since 1983; 67 percent were matched. The number of physician applicants increased by 6 percent, and 47 percent were successful in the match.

The number of U.S. citizen-FMGs who applied decreased by 353 to 1,601, only slightly more than half of the number in 1984; 43 percent successfully matched, an increase of 4 percentage points. The number of alien FMGs decreased by 22 percent to 4,444, and the percentage matched increased by 10 percentage points to 34 percent.

The number of positions offered for the first postgraduate year (PGY-1) increased by 277; 217 more were offered in the generalist* specialties than in 1986 (Table 2), an increase of 0.2 percentage points to 65.7 percent of all positions offered. The ratio of positions per initially enrolled applicant was 0.8, an increase of 0.1; that of positions per all U.S. senior and other U.S.-Canadian citizen applicants (including U.S. FMGs) was 0.9; and that per U.S. senior was 1.2. The ratios for active applicants in the match were, respectively 1.0, 1.1, and 1.3. (Table 2 is on page 532.)

The overall filling of PGY-1 positions decreased by 1.9 percentage points, the filling of positions by U.S. seniors decreased by 1.9 percentage points, and the filling by all other applicants did not change. The most competitive programs were again in emergency medicine, obstetrics/gynecology, the surgical specialties, and radiology. The participation of programs and positions in orthopedic surgery again increased slightly. The low number of positions in neurological surgery, otolaryngology, and urology is attributable to the withdrawal of many programs in order to participate in non-NRMP matches. Again, only a few programs in plastic surgery participated in the match. The distribution of matched U.S. seniors among types of programs increased slightly in family practice, psychiatry, and the support specialties and the percentage of the class entering internal medicine and general surgery decreased.

An increased number of advanced programs for students (PGY-2 positions) were offered in the match this year; 183 programs offered 925 positions, 71 percent of which were filled by 639 U.S. seniors and 84 percent were filled by a total of 681 applicants. Fifty-four programs in diagnostic radiology offered 190 PGY-2 positions, 71 percent of which were filled by U.S. senior students and 9 percent were filled by physician applicants for a total filling of 80 percent. A total of 104 programs in anesthesiology offered 642 positions, 69 percent of which were filled by U.S. senior students and 3 percent were filled by other applicants for a total filling of 72 percent. Ninety percent of those senior students who were matched to PGY-2 positions were also matched to PGY-1 positions.

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*"Generalist" specialties are defined as family practice, internal medicine, obstetrics/gynecology, and pediatrics.

TABLE 1

Participation in the National Resident Matching Program in 1987

Category	U.S. Senior Students		Other U.S. and Canadian Students*		U.S. Foreign Graduates		Foreign-Born Foreign Graduates		Total Applicants	
	No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.	Percent
Total applicants	15,729	100.0	3,096	100.0	1,601	100.0	4,444	100.0	24,870	100.0
Withdrew	1,263	8.0	1,417	45.8	560	35.0	1,576	35.5	4,816	19.4
Active participants	14,466	92.0	1,679	54.2	1,041	65.0	2,868	64.5	20,054	80.6
Matched	13,596	94.0	989	58.9	448	43.0	980	34.2	16,013	79.8
Unmatched	870	6.0	690	41.1	593	57.0	1,888	65.8	4,041	20.2
Total	14,466	100.0	1,679	100.0	1,041	100.0	2,868	100.0	20,054	100.0

* Other U.S. and Canadian students consist of graduates from U.S. osteopathic schools and Canadian medical schools; physician candidates, that is, earlier U.S. graduates seeking a position in graduate medical education; "fifth pathway" students, who are U.S. nationals who completed course requirements for a medical degree abroad followed by a year of clinical training in a U.S. hospital under medical school sponsorship.

In the 1987 match 694 individuals participated as 347 couples; 91 percent of these U.S. students were successfully matched.

Several specialty matches for physician candidates were carried out by the NRMP in 1986. In the fall, 22 programs offered 46 positions in colon and rectal surgery; 100 percent were filled by 55 percent of the applicants. Late in the fall, 22 programs in emergency medicine offered 122 positions; 100 percent of them were filled by 36 percent of the applicants. In the specialty match for dermatology last fall, there were 542 applicants for 195 positions. A total of 193 (36 percent) physicians were matched to fill 99 percent of the positions.

A new match, the Medical Specialties Matching Program (MSMP), took place in June 1986 for fellowships in all of the subspecialties of internal medicine for positions to begin in July 1987. The number of participating programs was 1,184 in 16 subspecialties, and these programs offered 2,073 positions. Seventy-eight percent of these positions were filled by 1,622 applicants, who represented 72.4 percent of the active applicants.

Data that describe the trends in numbers of positions offered and filled by U.S. seniors and other applicants during the past several years are included in the NRMP's annual directories (3).

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TABLE 2

Positions Offered and Filled by Specialty and Type of Applicants in the NRMP in 1987

Specialties	Positions Offered		Applicants Matched											
			U.S. Senior Students			Other U.S. and Canadian Citizens‡			Foreign-Born Foreign Graduates			Total Applicants		
	No.	Percent*	No.	Percent		No.	Percent		No.	Percent		No.	Percent	
				*	†		*	†		*	†		*	†
Family practice	2,395	12.6	1,728	12.7	72.2	216	15.0	9.0	35	3.6	1.5	1,979	12.4	82.6
Internal medicine	7,076	37.2	4,781	35.2	67.6	578	40.2	8.2	468	47.8	6.6	5,327	36.4	82.3
Pediatrics	2,009	10.5	1,366	10.0	68.0	157	10.9	7.8	207	21.1	10.3	1,730	10.8	86.1
Obstetrics/gynecology	1,031	5.4	828	6.1	80.3	83	5.8	8.1	16	1.6	1.6	927	5.8	89.9
Psychiatry	987	5.2	675	5.0	68.4	77	5.4	7.8	73	7.4	7.4	825	5.2	83.6
Medical specialties	73	0.0	50	0.4	68.5	3	0.2	4.1	6	0.6	8.2	59	0.4	80.8
Dermatology	7	0.0	6	0.0	85.7	0	0.0	—	0	0.0	—	6	0.0	85.7
Neurology	47	0.1	30	0.2	63.8	2	0.1	4.3	5	0.5	10.6	37	0.2	78.7
Ophthalmology	19	0.0	14	0.1	73.7	1	0.1	—	1	0.1	5.3	16	0.1	84.2
General surgery	2,282	12.0	1,703	12.5	74.6	136	9.5	6.0	57	5.8	2.5	1,896	11.8	83.1
Surgical specialties	537	2.8	469	3.4	87.3	49	3.4	9.1	3	0.3	0.6	521	3.3	97.0
Neurosurgery	32	0.2	27	0.2	84.4	1	0.1	3.1	0	0.0	—	28	0.2	87.5
Orthopedics	384	2.0	335	2.5	87.2	38	2.6	9.9	3	0.3	0.8	376	2.3	97.9
Otolaryngology	40	0.2	34	0.3	85.0	5	0.3	12.5	0	0.0	—	39	0.2	97.5
Urology	74	0.4	66	0.5	89.2	5	0.3	6.8	0	0.0	—	71	0.4	95.9
Plastic surgery	7	0.0	7	0.0	100.0	0	0.0	—	0	0.0	—	7	0.0	100.0
Support specialties	1,447	7.6	1,022	7.5	70.6	80	5.6	5.5	61	6.2	4.2	1,163	7.3	80.4
Anesthesiology	323	1.7	249	1.8	77.1	5	0.3	1.5	8	0.8	2.5	262	1.6	81.1
Emergency medicine	298	1.6	264	1.9	88.6	32	2.2	10.7	2	0.2	0.7	298	1.9	100.0
Pathology	471	2.5	209	1.5	44.4	24	1.7	5.1	43	4.4	9.1	276	1.7	58.6
Physical medicine	76	0.4	66	0.5	86.8	4	0.3	5.3	2	0.2	2.6	72	0.4	94.7
Preventive medicine	8	0.0	2	0.0	25.0	0	0.0	—	2	0.2	25.0	4	0.0	50.0
Diagnostic radiology	258	1.4	221	1.6	85.7	15	1.0	5.8	3	0.3	1.2	239	1.5	92.6
Therapeutic radiology	13	0.1	11	0.1	84.6	0	0.0	—	1	0.1	7.7	12	0.1	92.3
Transitional	1,210	6.4	974	7.2	80.5	58	4.0	4.8	54	5.5	4.5	1,086	6.8	89.8
Total	19,047	100.0	13,596	100.0	71.4	1,437	100.0	7.5	980	100.0	5.1	16,013	100.0	84.1

* Percent distributions of positions offered and filled among specialties (percentages may not add due to rounding).

† Percent of positions offered in specialty that were filled by applicants.

‡ This category consists of those students listed in the footnote to Table 1 plus U.S. foreign medical graduates.

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Changes in the Qualifications Of Medical School Applicants, 1981 to 1985

Cynthia G. Tudor, Ph.D., and Robert L. Beran, Ph.D.

Abstract—The decline in the number of medical school applicants has prompted concerns among medical educators regarding the effects of this decrease on the qualifications of the applicant pool. Changes in the qualifications of medical school applicants were analyzed in terms of age, sex, and ethnicity or racial group using two measures of quality: Medical College Admission Test (MCAT) scores and grade-point averages. The distributions of these measures for 1981 and 1985 applicants were compared. The results showed that there were significant but modest gains over the years in the percentage of men and women applicants who scored from 10 to 15 on the MCAT biology, chemistry, physics, and science problems subtests. There were also significant percentage gains for applicants in all age categories, except applicants over age 32, and for all ethnic or racial groups except blacks. The authors conclude that a variety of sociodemographic, educational, and selection factors may account for these changes.

From 1981 to 1985, the number of U.S. citizens applying to medical schools dropped from 33,978 to 30,259, a decline of 12.3 percent. During this same period, the number of 18- to 24-year-olds in the U.S. population—the age group that has customarily been a major source of applicants to medical school—dropped by only 5.9 percent (1). The decreasing number of applicants, accompanied by a fairly stable first-year class size, has affected the applicant-to-acceptance ratio. This ratio declined from about 2:1 in 1981 to 1:1.9 in 1985, and the drop has prompted concerns among medical educators regarding the qualifications of the applicant pool. Are applicants who were not previously competitive now being considered for acceptance to medical school? The authors' purpose in the study reported here was to compare changes in the qualifications of medical school applicants from 1981 to 1985 by the applicants' age, sex, and ethnic or racial group.

Method

The qualifications of medical school applicants in 1981 and in 1985 were analyzed using two measures of quality: Medical College Admission Test (MCAT) scores and undergraduate grade-point averages (GPAs). While MCAT scores and grade-point averages are only two of the possible indicators of the qualifications of an applicant, these measures were chosen for analysis because they are quantifiable

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and widely available. In addition, these two indices are widely used and considered to be highly important by medical school admissions personnel. These data were obtained from the Student and Applicant Information Management System maintained by the Association of American Medical Colleges. This system contains background and academic information on each individual who applies to a U.S. medical school accredited by the Liaison Committee on Medical Education.

The distributions of MCAT scores and grade-point averages were compared for the 1981 and 1985 applicant pools. Scores for each of the six MCAT subtests were grouped into three categories: 1–6 (lowest), 7–9 (middle), and 10–15 (highest). The highest range of scores includes MCAT scores that are one or more standard deviations above the mean. Grade-point averages were categorized in the following manner: 0.01–2.50, 2.51–3.00, 3.01–3.50, and 3.51–4.00.

A *z*-test was used to determine whether the difference between two proportions was significant (2). For example, this test can determine whether the proportion of applicants scoring from 10 to 15 on an MCAT test in 1985 differed significantly from the proportion scoring in that category on the same test in 1981. In addition, the *z*-tests were used to determine the significance of the difference between the proportion of applicants in different population groups (for example, men and women, members of ethnic or racial groups) scoring in the same category in the same year. A *z*-value equal to or greater than 1.96 was chosen to establish statistically significant differences.

In these analyses, age was categorized as 23 years or less, 24 to 27 years, 28 to 31 years, and 32 to 50 years. Only one person in the sample was over 50 years of age. Ethnicity and racial categories were based on self-identification. They were whites; blacks, minority groups (other than blacks) underrepresented in medical school (mainland Puerto Rican, Mexican American-Chicano, and Native American); and minority groups not underrepresented in medical schools (predominantly Asian-Americans or Pacific Islanders but also Commonwealth Puerto Ricans and other Hispanics). Only U.S. citizens were included in the analysis. The final sample consisted of 33,978 applicants in 1981 and 30,259 applicants in 1985; however, the sample sizes for individual analyses varied slightly because of missing data.

Initial Analysis

In an initial analysis of the data, the present authors in 1986 examined changes in the distribution of MCAT scores and grade-point averages (3). The results of that analysis indicated that the proportion of applicants scoring above 10 on the MCAT biology, chemistry, physics, and science problems subtests increased between 1981 and 1985. The slight increase in the proportion of applicants with scores in the high end of the distribution (scores of 10 to 15) in 1985 was accompanied by a slight decrease in the proportion of applicants with scores in the low end of the distribution (scores of 1 to 6).

There were only slight changes between 1981 and 1985 in the distribution of scores on the quantitative skills and reading skills subtests. The proportion of applicants who had science GPAs (that is, in biology, chemistry, physics, and mathematics) and overall GPAs above 3.50 declined from about 34 percent in 1981 to 31 percent in 1985. These declines may be due to decreases in the level of grade inflation observed on many campuses (4).

In summary, these initial findings support the contention that the qualifications of the national applicant pool, as based on MCAT scores, did not diminish between 1981 and 1985 but instead improved slightly. The GPAs showed a slight decline, but the decrease may have been due to less grade inflation.

Results

The analyses reported below examined changes in the qualifications of the applicants by age, sex, and ethnic or racial group.

AGE

The percentage of the applicants who had scores of 10 to 15 on the MCAT biology, chemistry, physics, and science problems subtests was significantly higher across all age categories in 1985 than in 1981 (Table 1). Except on the biology subtest, where all age groups made large gains of 8 to 10 percentage points, the older applicants (age 28 and older) in general achieved smaller gains in percentage points in 1985 than the younger applicants (age 27 or less) on the subtests. Small percentage increases in the higher range of reading skills scores were made by all age groups except applicants aged 28 to 31 years, and there were small percentage declines (2.2–3.4) in the higher range of the quantitative skills scores between 1981 and 1985 for older applicants (those 24 and over).

TABLE 1

Percentages of U.S. Medical School Applicants, by Age, Who Received Scores in Each of Three Ranges on the Six Subtests of the Medical College Admission Test, 1981 and 1985*

Subtests and Ranges	23 years or less		24 to 27 years		28 to 31 years		32 to 50 years	
	1981	1985	1981	1985	1981	1985	1981	1985
Biology								
1–6	16.0	11.7	18.0	11.9	20.0	14.3	26.7	18.2
7–9	40.8	36.6	41.8	37.9	43.4	39.3	39.3	39.6
10–15	43.1	51.6	40.2	50.2	36.6	46.3	33.9	42.2
Chemistry								
1–6	16.2	16.4	23.0	21.0	29.1	26.0	38.0	30.6
7–9	41.3	38.6	45.1	43.2	43.1	42.6	37.7	42.7
10–15	42.6	45.1	31.8	35.8	27.7	31.3	24.2	26.6
Physics								
1–6	17.9	14.8	24.9	19.7	29.4	25.2	34.2	28.7
7–9	40.0	37.1	44.0	43.0	42.3	43.1	38.9	42.5
10–15	42.1	48.0	31.1	37.3	28.3	31.7	26.9	28.8
Science Problems								
1–6	17.5	15.1	22.8	18.3	26.9	22.5	34.4	27.4
7–9	42.3	39.9	45.3	44.5	44.8	45.0	39.2	45.0
10–15	40.3	45.1	31.9	37.2	28.3	32.5	26.4	27.6
Reading Skills								
1–6	17.8	15.9	18.6	18.6	18.5	18.7	23.6	19.5
7–9	50.9	49.9	50.4	50.0	46.6	46.8	45.2	46.5
10–15	31.3	34.2	30.9	31.4	34.8	34.5	31.3	34.1
Quantitative Skills								
1–6	21.9	20.4	27.1	26.5	29.7	30.4	35.4	32.3
7–9	43.4	44.4	44.6	46.0	42.0	44.7	38.5	43.7
10–15	34.7	35.3	28.3	27.5	28.3	24.9	26.1	23.9

* Sample sizes: 1981 applicants = 18,679, ages 23 years or less; 10,153, ages 24 to 27 years; 3,612, ages 28 to 31 years; 1,529, ages 32 to 50 years; 1985 applicants = 16,336, ages 23 years or less; 8,602, ages 24 to 27 years; 3,355, ages 28 to 31 years; and 1,962, ages 32 to 50 years. Percentages may not add to 100 due to rounding.

Consistent with the trends found in the national applicant pool (3), small declines in the percentages of applicants with science GPAs greater than 3.00 were observed for all age categories except applicants over 31 years of age. Declines in overall GPA were observed for only two age categories (applicants less than 28 years of age), as shown in Table 2.

SEX

The analysis of changes in MCAT scores by sex showed that a significantly greater proportion of both men and women scored between 10 to 15 on the MCAT biology, chemistry, physics, and science problems subtests in 1985 than in 1981 (Table 3). While the men and women achieved approximately equal gains in the physics and science problems subtests, the men had greater gains than women on the biology and chemistry subtests between 1981 and 1985.

Although no changes were evident in the distribution of scores on the reading skills and quantitative skills subtests from 1981 to 1985, the results of analysis by sex showed that a significantly higher proportion of the men scored from 10 to 15 on the reading skills subtest in 1985 than in 1981, while the proportion of women scoring in this range declined slightly.

The percentages of men and women who had GPAs higher than 3.50 declined significantly between 1981 and 1985 (Table 4). This finding was similar to the pattern of changes for the national applicant pool (3). These declines for women were greater than for men.

ETHNIC OR RACIAL GROUPS

The percentage of all four ethnic or racial groups that scored from 10 to 15 on the MCAT biology, chemistry, physics, and science problems subtests increased between 1981 and 1985 (Table 5). Significant percentage increases in biology subtest scores were made by all the groups. Increases in physics, chemistry, and science problems subtest scores were significant for all groups except blacks. For example, the percentage of blacks scoring from 10 to 15 on the science problems subtest increased by .7 of a percentage

TABLE 2

Percentages of U.S. Medical School Applicants, by Age, Who Had Undergraduate Science and Overall Grade-Point Averages (GPA) in Each of Four Ranges, 1981 and 1985*

Types of GPAs and Ranges	23 years or less		24 to 27 years		28 to 31 years		32 to 50 years	
	1981	1985	1981	1985	1981	1985	1981	1985
Science†								
0.01–2.50	5.3	5.6	11.0	11.9	15.8	15.5	22.5	16.4
2.51–3.00	14.9	16.6	24.7	26.4	26.1	26.8	28.4	27.0
3.01–3.50	37.2	38.5	41.4	40.8	35.8	36.1	29.7	36.2
3.51–4.00	42.6	39.3	22.9	20.8	22.3	21.6	19.4	20.4
Overall‡								
0.01–2.50	2.1	2.0	5.8	5.8	10.0	8.8	17.6	11.1
2.51–3.00	10.4	11.2	20.7	21.7	28.2	25.7	34.6	30.4
3.01–3.50	39.7	41.3	48.4	48.8	42.2	44.3	34.3	40.5
3.51–4.00	47.6	45.4	25.0	23.7	19.5	21.2	13.6	18.0

* Percentages may not add to 100 due to rounding.

† Sample sizes: 1981 applicants = 17,523, ages 23 years or less; 9,381, ages 24 to 27 years; 3,300, ages 28 to 31 years; and 1,352, ages 32 to 50 years; 1985 applicants = 15,151, ages 23 years or less; 7,797, ages 24 to 27 years; 2,998, ages 28 to 31 years; and 1,726, ages 32 to 50 years.

‡ Sample sizes: 1981 applicants = 17,525, ages 23 years or less; 9,387, ages 24 to 27 years; 3,305, ages 28 to 31 years; and 1,352, ages 32 to 50 years; 1985 applicants = 15,154, ages 23 years or less; 7,804, ages 24 to 27 years; 3,003, ages 28 to 31 years; and 1,726, ages 32 to 50 years.

TABLE 3

Percentages of Men and Women U.S. Medical School Applicants Who Received Scores in Each of Three Ranges on the Six Subtests of the Medical College Admission Test, 1981 and 1985*

Subtests and Ranges	Men		Women	
	1981	1985	1981	1985
Biology				
1–6	15.2	10.3	22.6	16.5
7–9	40.7	35.7	42.6	40.9
10–15	44.1	54.0	34.8	42.7
Chemistry				
1–6	17.5	16.1	27.2	26.4
7–9	41.1	38.6	45.3	44.1
10–15	41.3	45.2	27.5	29.5
Physics				
1–6	16.6	13.3	33.4	27.5
7–9	39.9	36.9	44.8	45.1
10–15	43.5	49.8	21.8	27.4
Science Problems				
1–6	16.8	13.7	29.5	24.8
7–9	42.4	40.4	45.2	45.1
10–15	40.8	45.9	25.3	30.0
Reading Skills				
1–6	18.7	16.9	17.8	17.7
7–9	51.6	50.5	46.6	47.2
10–15	29.7	32.5	35.5	35.1
Quantitative Skills				
1–6	21.4	19.5	32.5	32.3
7–9	42.9	44.5	44.4	45.3
10–15	35.7	36.0	23.1	22.3

* Sample sizes: 1981 applicants = 23,218 men and 10,740 women; 1985 applicants = 19,635 men and 10,624 women. Percentages may not add to 100 due to rounding.

point from 1981 to 1985. The increases for whites, other underrepresented minorities, and other minorities were about 5 percentage points, 6 percentage points, and 9 percentage points, respectively.

Changes in the percentage of applicants scoring from 7 to 9 on the biology, chemistry, physics, and science problems subtests varied across the four groups. While there was a decrease in the percentage of whites and other minority applicants who scored from 7 to 9 on these four subtests, there was an increase in the percentage of blacks who scored in this range on these subtests except the chemistry subtest. The members of the other underrepresented minority groups scored higher on some subtests and lower on others.

Significant increases in the percentages in the upper range (10 to 15) of reading skills scores between 1981 and 1985 were limited to whites and to members of other minorities; only the other minorities also showed significant increases in this range on the quantitative skills subtest.

The percentage of other underrepresented minority applicants who achieved total and science grade-point averages above 3.50 increased slightly from 1981 to 1985 (Table 6). All other ethnic or racial groups experienced slight declines in the percentage who had GPAs higher

TABLE 4

Percentages of Men and Women U.S. Medical School Applicants Who Had Undergraduate Science and Overall Grade-Point Averages (GPA) in Each of Four Ranges, 1981 and 1985*

Types of GPAs and Ranges	Men 1981	Men 1985	Women 1981	Women 1985
Science†				
0.01–2.50	8.8	8.6	8.9	10.2
2.51–3.00	19.9	21.4	18.7	20.6
3.01–3.50	38.0	38.5	38.0	39.1
3.51–4.00	33.2	31.5	34.5	30.0
Overall‡				
0.01–2.50	5.0	4.5	3.9	4.3
2.51–3.00	17.1	17.6	14.9	15.8
3.01–3.50	42.6	43.6	41.9	44.0
3.51–4.00	35.2	34.4	39.3	36.0

* Percentages may not add to 100 due to rounding.

† Sample sizes: 1981 applicants = 21,608 men and 9,932 women; 1985 applicants = 17,949 men and 9,726 women.

‡ Sample sizes: 1981 applicants = 21,616 men and 9,937 women; 1985 applicants = 17,957 men and 9,733 women.

than 3.50, and whites were the only group to show a significant decline.

Summary

The data reported here indicate that, while the number of applicants to medical school declined between 1981 and 1985, the qualifications of the 1985 applicants did not decrease from 1981 but instead improved slightly. The analyses of the total applicant pool (3) and the applicant pool stratified by age, sex, and ethnic or racial group provide support for this conclusion. There were significant but modest gains in the percentages of men and women who scored from 10 to 15 on the MCAT biology, chemistry, physics, and science problems subtests. There were also significant gains on these subtests for the age categories except applicants over age 32 and for the ethnic or racial groups except blacks.

Similar to the findings from the analysis of the total applicant pool (3), there were few significant changes by age, sex, or ethnic or racial groups in the percentage of applicants scoring in the 10 to 15 range on the quantitative skills and reading skills subtests. Significant declines in grade-point averages were the most evident for whites and were more substantial for women than for men.

Discussion

Recently, the decrease in the number of applicants to medical school has been cause for considerable discussion and concern among medical educators. Fundamental to their concern is the perception that the decrease in available applicants has been accompanied by a change in the qualifications of the applicant group. Specifically, with fewer applicants from which to choose, schools could be in the position of considering individuals with qualifications that may not have been competitive previously.

The results of the present study support previous findings that suggested that for

TABLE 5

Percentages of U.S. Medical School Applicants, by Ethnic or Racial Group, Who Received Scores in Each of Three Ranges on the Six Subtests of the Medical College Admission Test, 1981 and 1985*

Subtests and Ranges	Whites		Blacks		Other Underrepresented Minorities		Other Minorities	
	1981	1985	1981	1985	1981	1985	1981	1985
Biology								
1–6	12.9	8.2	60.4	50.2	37.7	27.9	26.5	17.9
7–9	42.2	37.4	32.1	39.2	42.0	44.1	39.1	36.0
10–15	44.9	54.4	7.5	10.6	20.3	28.0	34.4	46.2
Chemistry								
1–6	16.1	14.8	63.9	66.8	43.6	41.4	26.0	22.1
7–9	43.8	42.4	30.3	27.3	42.1	39.8	38.4	35.2
10–15	40.1	42.8	5.8	5.9	14.3	18.8	35.6	42.7
Physics								
1–6	16.8	13.0	72.0	65.9	46.7	40.7	29.4	23.0
7–9	43.4	41.3	23.2	29.0	39.3	42.6	35.7	34.1
10–15	39.9	45.7	4.9	5.0	14.1	16.6	34.9	42.9
Science Problems								
1–6	15.6	12.5	69.4	64.8	45.3	39.3	29.3	21.9
7–9	45.2	43.9	26.2	30.1	43.0	42.8	36.7	35.6
10–15	39.2	43.7	4.4	5.1	11.7	17.9	34.0	42.5
Reading Skills								
1–6	12.6	11.1	62.4	58.7	43.4	38.6	38.8	33.0
7–9	52.2	51.1	32.8	36.4	43.8	47.3	42.6	44.1
10–15	35.3	37.8	4.7	4.9	12.8	14.1	18.6	22.9
Quantitative Skills								
1–6	18.6	17.3	78.4	78.4	55.3	52.6	40.3	33.8
7–9	46.1	47.8	18.5	19.0	35.2	36.3	37.2	40.5
10–15	35.3	34.9	3.1	2.6	9.5	11.0	22.5	25.7

* The four ethnic or racial groups were: whites; blacks; members of underrepresented minorities other than blacks (mainland Puerto Ricans, Mexican-Americans, and Native Americans); and members of other minorities, that is, other than blacks and the underrepresented minorities (for example, Asian-Americans and Pacific Islanders, Commonwealth Puerto Ricans, and other Hispanics). Sample sizes: 1981 applicants = 28,376 whites, 2,189 blacks, 838 other underrepresented minorities, and 2,323 other minorities; 1985 applicants = 24,261 whites, 1,967 blacks, 842 other underrepresented minorities and 3,057 other minorities. Percentages may not add to 100 due to rounding.

the period 1981 to 1985 there was little decline in the qualifications of applicants (3). Since the qualifications of the 1985 national applicant group cannot necessarily be considered to predict the qualifications of future groups of applicants, a continual decrease in the number of applicants could affect the qualifications of applicants in subsequent years. However, there is little reason to suggest that a decreasing number of applicants, per se, is a precursor of declining qualifications.

These analyses do not address the effect of the decline in the number of applicants on the qualifications of applicant groups to specific schools. In particular, the investigators did not consider any effects of the declining pool on the ability of institutions, especially state-supported schools, to fill their classes primarily with in-state residents.

The results of the analysis of changes by age suggest that the younger students (age 27 years or less), who comprise the

TABLE 6

Percentages of U.S. Medical School Applicants, by Ethnic or Racial Group, Who Had Undergraduate Science and Overall Grade-Point Averages (GPA) in Each of Four Ranges, 1981 and 1985*

Types of GPAs and Ranges	Whites		Blacks		Other Underrepresented Minorities		Other Minorities	
	1981	1985	1981	1985	1981	1985	1981	1985
Science†								
0.01–2.50	5.3	5.2	49.1	49.3	27.9	23.8	10.2	10.5
2.51–3.00	18.4	19.9	29.0	29.5	29.4	30.6	21.8	23.3
3.01–3.50	39.9	41.1	15.9	16.1	29.4	31.5	37.6	37.1
3.51–4.00	36.4	33.8	6.0	5.1	13.2	14.1	30.4	29.1
Overall‡								
0.01–2.50	2.4	2.0	32.6	30.9	14.1	11.3	5.2	4.2
2.51–3.00	14.1	14.3	38.4	38.9	35.1	35.6	19.0	18.9
3.01–3.50	44.0	45.6	22.7	23.8	35.4	36.5	42.3	43.8
3.51–4.00	39.5	38.2	6.4	6.3	15.6	16.7	33.6	33.1

* The four ethnic or racial groups were: whites; blacks; members of underrepresented minorities other than blacks (mainland Puerto Ricans, Mexican-Americans, and Native Americans); and members of other minorities, that is, other than blacks and the underrepresented minorities (for example, Asian-Americans and Pacific Islanders, Commonwealth Puerto Ricans, and other Hispanics). The percentages may not add to 100 due to rounding.

† Sample sizes: 1981 applicants = 26,832 whites, 1,900 blacks, 708 other underrepresented minorities, and 1,892 other minorities; 1985 applicants = 22,471 whites, 1,874 blacks, 660 other underrepresented minorities, and 2,544 other minorities.

‡ Sample sizes: 1981 applicants = 26,843 whites, 1,900 blacks, 708 other underrepresented minorities, and 1,894 other minorities; 1985 applicants = 22,482 whites, 1,876 blacks, 660 other underrepresented minorities, and 2,545 other minorities.

majority of applicants, improved their qualifications from 1981 to 1985. While the MCAT and GPA gains of the older students were not as dramatic as those of younger students, these older students also showed increasing qualifications. The authors believe that this may be due to the increased number of postbaccalaureate programs that have emerged in recent years to provide concentrated study in subjects helpful to the medical school applicant.

The percentage of women who achieved MCAT scores in the high ranges (10 to 15) increased in 1985. While the percentage of women scoring in this range did not exceed the percentage of men scoring in the same categories, the percentages of women scoring from 10 to 15 increased.

In a 1985 study, Shea and Fullilove (5) concluded that the MCAT scores of blacks improved by a greater amount than did the scores of whites between 1977 and 1983. Their study examined score changes and categorized the distribution of accepted applicants by MCAT scores of 1 to 4, 5 to 7, and 8 and above. The results of the present analysis indicate that the percentage of black applicants who scored from 10 to 15 on the chemistry, physics, and science problems subtests did not increase between 1981 and 1985.

One explanation for the apparent difference in the findings of these two studies concerns the variation in the method of categorizing MCAT scores. The middle range of MCAT scores (scores of 7 to 9) used in the present analysis overlaps the upper range of scores (scores of 8 and over) used by Shea and Fullilove (5).

While there was not a significant increase in 1985 in the percentage of blacks who scored from 10 to 15, there was a significant increase in the percentage of black applicants who scored from 7 to 9. Thus, the improvement in MCAT scores for black applicants noted by Shea and Fullilove appears to occur chiefly at the score levels of 8 and 9.

Several other factors should be considered when attempting to interpret the lack of significant increases in the percentage of black applicants scoring in the 10 to 15 range. The first factor is that the MCAT scores of black applicants may be affected by the lower ratio of male-to-female applicants in the black applicant pool. As a group, women do not perform as well as men on the MCAT biology, chemistry, physics, and science problems subtests, and blacks are the only applicant group that has more female than male applicants. Second, there was no consistent increase in the percentage of black applicants who had physical science or humanities as their undergraduate major. MCAT examinees majoring in these areas generally perform better on these four MCAT subtests (6, 7) than those with other majors.

One explanation of the improvement in the qualifications of the total applicant pool might be that an increasing number of potential applicants did not apply due to low grade-point averages and/or low MCAT scores. Thus, such a decline in potential applicants with lesser qualifications might have naturally resulted in an applicant group with higher GPAs and MCAT scores. Changes also occurred during the study period in the number of potential applicants, that is, primarily those persons who had taken the MCAT examination. The pool of MCAT examinees decreased from 48,203 in 1981 to 42,432 in 1985 (6, 7). Regardless of the decline in the number of MCAT examinees and the number of medical school applicants, results of the present analysis showed that the qualifications of the resulting applicant pool improved.

It is important to remember that the demographic and academic characteristics of medical school applicants are not necessarily similar to those of MCAT examinees, nor are they generalizable to those of college students as a whole. Thus, the qualifications of black medical school applicants are not necessarily similar to those of black examinees or black undergraduate college students. Furthermore, while there is self-selection of individuals into the MCAT examinee pool, there is also self-selection from this pool to the applicant pool. For example, a number of examinees who score in the 1-to-6 range on MCAT tests do not apply to medical school. Different decisions by various racial or ethnic groups not to become applicants may affect the qualifications of the resulting applicant pool.

An analysis of Graduate Record Examination (GRE) data lends additional information about the effects of such decisions. The GRE is a standardized examination, administered by the Educational Testing Service, that is used by many graduate programs as a prerequisite for admission to graduate school. The GRE and the MCAT produce similar types of information on test results across different examinee groups. A comparison of the data on examinees who take these examinations could show whether changes in the applicant pool of one examination were also occurring in the pool of the other. While information was not available on the distribution of GRE scores by the age and sex of the examinees, changes in GRE scoring patterns between 1981 and 1985 were examined by other investigators (8, 9) using ethnic or racial categories and scoring ranges similar to those used in the present study. Those GRE analyses showed that there was little change in the percentage of examinees scoring in the upper range of GRE scores between 1981 and 1985 for any ethnic or racial group. While this lack of change may be due to the measurement qualities of the GRE, it may also be due to the sociodemographic and academic characteristics of individuals who elected to take this examination. Thus, changes in MCAT scoring patterns of different age and ethnic or racial groups and of men versus women may be due to changes between 1981 and 1985 in the characteristics of examinees who elected to take the test.

The explanations given here can only suggest factors that might affect differences in MCAT test scores over time. While no one factor can be considered to have caused the changes, there is enough evidence to suggest that the lack of an increase in the percentage of blacks scoring from 10 to 15 on MCAT tests may be due to a combination of sociodemographic, educational, and self-selection factors. More research is needed on the differential impact of each of these types of factors on the qualifications of medical school applicants.

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Validity of Scoring 'Dangerous Answers' On a Written Certification Examination

Stephen Slogoff, M.D., and Francis P. Hughes, Ph.D.

Abstract—The American Board of Anesthesiology (ABA) investigated the possibility that selection of a disproportionately high number of incorrect "dangerous answers" by candidates who would otherwise pass the board's written certification examination might relate to dangerous clinical practice by the candidates. In that case, scoring the examination for dangerous answers would provide an alternate scoring method. Twenty-nine multiple-choice questions in the 1983 written examination were identified by a panel of judges as containing incorrect answers with "truly, not potentially" dangerous consequences. The 1,036 candidates who passed the 1983 examination selected an average of 1.6 dangerous answers, and the 1,413 who failed the examination selected an average of 3.4 ($p < .001$). Ninety-two candidates who passed and who selected four or more dangerous answers were tracked through the certification process to learn whether labeling them as "smart but dangerous" was justified. Reports of their clinical competence from their residency programs did not relate dangerous behavior for any of these candidates. The 86 of these 92 candidates who subsequently took the ABA oral examination had pass rates that were identical to those of all candidates in 1983 and that were completely independent of the candidates' absolute and relative frequency of choosing dangerous answers. It is concluded that selection of dangerous answers in a multiple-choice test is the result of lack of information rather than a purposeful action and implementation of the scoring system for dangerous answers would likely be unjustified and unfairly punitive.

In 1984 the Committee on Study of Evaluation Procedures (COSEP) of the American Board of Medical Specialties reported to its member boards during its annual meeting the results of a preliminary study of candidates who selected incorrect responses that could be considered dangerous in answering multiple-choice questions on written certifying examinations. Specifically, a retrospective evaluation of examinations given by four member specialty boards was performed, and four distinct groups of candidates were identified in regard to their choice of "dangerous answers." There were two large groups: one consisted of passing candidates who selected few dangerous answers, and the other consisted of failing candidates who selected many dangerous answers. There were two small groups:

The study reported here was conducted by the American Board of Anesthesiology.

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For related editorial, see page 700.

one consisted of failing candidates who selected few dangerous answers and the other of those who passed but selected a disproportionately high number of dangerous answers.

In their presentation, the COSEP investigators speculated that this last group, the "smart but dangerous" candidates, might constitute a truly hazardous group of practitioners and might be identified by scoring dangerous answers separately in addition to grading the entire examination. The examination questions with dangerous answers would serve as a special subset of the examination. No further analyses were performed to determine whether the clinical patterns of this group justified labeling the group as "smart but dangerous." No published reports have been found in the literature that deal with validation of this grading methodology.

The American Board of Anesthesiology (ABA), which did not participate in the COSEP study, requires completion of three separate processes for certification as a consultant: receipt of a certificate of clinical competence from the candidate's residency training program, satisfactory performance on a written examination that primarily evaluates factual knowledge and relatively direct clinical judgment, and, no less than one year later, satisfactory performance on an oral examination that tests more sophisticated and complex aspects of clinical judgment and practice. Stimulated by the preliminary COSEP report, the ABA performed a similar pilot study in 1985 using its 1982 written examination. The 1982 examination was chosen to permit immediate retrospective tracking of the group of "smart but dangerous" candidates through the other two aspects of the certifying process. Although about 10 percent of those who passed the written examination were designated as in this dangerous group based on their selection of a higher number of dangerous incorrect responses, neither the clinical competence committee reports nor oral examination data on these candidates indicated any deviant performance. The present report, based on data from the 1983 ABA written examination, is a detailed attempt to validate the hypothesis that selection of a disproportionately high number of dangerous answers predicts dangerous clinical thinking or behavior.

Methods

The 1983 ABA written examination contained 350 questions, of which 175 were single-answer multiple-choice questions. Of these 175, a total of 34 were selected for review because each possibly contained at least one dangerous response and that response had been selected by at least one passing candidate. These were independently examined by the eight members of the ABA examination committee, who were instructed to identify responses that, if selected, would have "truly, not potentially" dangerous consequences. The answers that were correct were not identified for the judges. For purposes of this study, a response was considered dangerous if it was judged so by at least four of the eight judges. An example of a question considered in the exercise is:

> A patient with aortic stenosis has chest pain while waiting for surgery. The EKG shows sinus tachycardia at a rate of 110/min. Blood pressure is 140/90 mmHg. The best therapeutic measure to relieve the chest pain is administration of
> A. nitroglycerin sublingually.
> B. propranolol.
> C. diazepam.
> D. supplemental oxygen.
> E. sodium nitroprusside by infusion.

The correct answer is "B," and all eight judges independently perceived response "E" to have truly dangerous consequences if selected and enacted.

The final subset of questions examined was composed of 29 questions with 43 incorrect, dangerous responses. The median number of votes for a dangerous answer in the subset was six, and the mean was 5.6. Two judges each perceived the correct answers to two different questions to be dangerous; neither question was included in the subset.

The written certifying examinations of the 2,449 ABA candidates in 1983 were rescored for performance on the subset of dangerous answers. For those who selected at least four dangerous answers, the ratio of such answers to all incorrect responses of the 29 subset questions and the ratio of such answers to all incorrect responses to the total 350 questions were calculated separately. The residency clinical competence reports for these candidates were then examined to identify comments relating to unsafe practice or behavior. For those candidates who selected at least four dangerous answers and passed the written examination, their oral examination performance was reviewed for both success and examiners' subjective comments. The performance of American medical graduates (AMGs) and foreign medical graduates (FMGs) were separated and compared.

Selection of four or more dangerous answers was arbitrarily selected to define the potentially dangerous group because this frequency permitted tracking of about 100 candidates (about 10 percent of those who passed the written examination) through the entire certification process. Continuous data were statistically analyzed by *t*-test for unpaired data. Means are reported with standard deviations.

Results

Of the 2,449 ABA candidates who took the 1983 examination, 1,036 passed and selected an average of 1.6 (S.D. = 0.3; range 0–7) of the 29 dangerous answers, while the 1,413 who failed selected 3.4 (S.D. = 0.4; range 0–10) dangerous answers ($p < .001$). To focus the study on the candidates who selected dangerous answers with unusual frequency, only those 723 who selected four or more were further evaluated. In this group, 92 passing candidates chose an average of 4.3 (S.D. = 0.8; range 4–7) dangerous answers and 631 failing candidates selected an average of 5.1 (S.D. = 0.3; range = 4–10; $p < .05$). Table 1 shows these data.

In the 29-question subset, the mean ratio of dangerous answers to all incorrect answers was 0.42 (S.D. = 0.08) for the 92 passing candidates who selected at least four dangerous answers and 0.31 (S.D. = 0.04) for the 631 failing candidates who selected four or more ($p < .01$), as indicated in Table 1. A similar relationship was found when the ratios of dangerous answers to incorrect responses for the entire 350 questions were calculated. Dangerous answers always comprised a larger fraction of incorrect responses for the passing than failing candidates in comparisons at the same frequency of such selection, because the passing candidates had fewer incorrect responses.

Since the ABA requires all candidates in its examination system to have an overall satisfactory rating on a clinical competence committee report covering their final residency training period, the final rating for each candidate must of necessity be satisfactory. However, awarding unsatisfactory ratings in individual categories of competence—which consist of knowledge, judgment, clinical skills, and character traits—is permitted while still giving a satisfactory rating for overall clinical competence. On the final reports only one of the 92 passing candidates received one unsatisfactory rating (in knowledge), and none of the failing candidates was judged unsatisfactory in any category.

TABLE 1

Percentages of 92 Passing and 631 Failing Candidates Who Chose Four or More Dangerous Answers to 29 Multiple-Choice Questions Containing Dangerous Answers and the Ratio of These Candidates' Dangerous Answers to the Total Number of Incorrect Answers for These 29 Questions on the 1983 Written Certification Examination of the American Board of Anesthesiology*

No. of Dangerous Answers	Passing Candidates		Failing Candidates	
	Percent	Ratio	Percent	Ratio
4	73	0.35	42	0.27
5	16	0.41	26	0.31
6	8	0.45	16	0.35
7	3	0.57	9	0.38
8	0	—	4	0.41
9	0	—	2	0.46
10	0	—	1	0.48

* Dangerous answers were judged independently by eight specialists as having "truly, not potentially" dangerous consequences. A total of 2,449 candidates took the 1983 examination, and 1,036 passed.

Eighty-six of the 92 candidates who had passed the written examination and selected four or more dangerous answers had taken their oral examination by the time of the study. Of the 50 AMGs, 28 (58 percent) passed; and eight (22 percent) of the 36 FMGs passed. These pass rates are comparable with the 64 percent of all AMGs and 31 percent of all FMGs in the total sample. The differences between the candidates from the potentially dangerous group and the overall candidate pool were not significant.

All three of the candidates who chose seven dangerous answers passed the oral examination, as did one of the five who chose six, five of the 15 who chose five, and 27 of the 63 who chose four dangerous answers.

The mean ratios of dangerous answers to incorrect answers for the dangerous answers subset was 0.37 (S.D. = 0.13) for the 36 candidates who passed the oral examination and 0.36 (S.D. = 0.11) for the 50 who failed, as indicated in Table 2. Fourteen of the 23 (61 percent) AMGs with ratios less than 0.35 passed, as did 14 of the 27 (62 percent) with ratios the same as or greater than 0.35. For the FMGs, these results were 16 percent and 29 percent, respectively. The differences were not significant.

Summary comments by each of the four oral examiners for these 86 candidates were reviewed for references to unsafe practice or judgment. One FMG who had selected four dangerous answers among 13 incorrect responses in the dangerous answer subset (ratio 0.31) failed the oral examination and was noted by one examiner to be "slow, hesitant, vacuous in some important clinical areas. . . . I think he is dangerous." Another FMG who had chosen four dangerous answers (ratio 0.36) and had failed the oral examination was reported by one examiner to be "potentially dangerous." A failing FMG who selected six dangerous answers (ratio 0.46) was noted by one examiner to have "superficial knowledge. He goes through the motions clinically but underlying actions are weak. . . . He also did several things that were dangerous." None of the remaining 341 summary comments about the 86 candidates contained references to safety.

TABLE 2

Numbers of 50 American Medical Graduates (AMGs) and 36 Foreign Medical Graduates (FMGs) Who Selected Four or More Dangerous Answers to 29 Multiple-Choice Questions with Dangerous Answers on the 1983 Written Certification Examination of the American Board of Anesthesiology (ABA) and the Percentages Who Passed the ABA Oral Examination at Their First Opportunity, by the Ratio of the Dangerous Answers to All Incorrect Answers to the 29 Questions on the Written Examination*

Ratios	AMGs		FMGs	
	No.	Percent	No.	Percent
<0.30	3	33	8	0
0.30–0.34	20	65	11	27
0.35–0.39	6	67	6	17
0.40–0.44	11	36	6	33
0.45–0.49	2	50	2	0
≥0.50	8	62	3	33

* Dangerous answers were judged independently by eight specialists as having "truly, not potentially" dangerous consequences. A total of 2,449 candidates took the 1983 written examination, and 1,036 passed. Of those who passed, a total of 92 had selected four or more dangerous answers; of these, 86 had taken the oral examination by the time of the study.

Discussion

The primary justification for using a secondary scoring method such as dangerous answer scoring in addition to traditional correct answer scoring when grading written certifying examinations is to prevent candidates from passing who deserve to fail but would otherwise be successful on the test. The preliminary COSEP report suggested this rationale might apply to the use of the dangerous answer scoring to identify the small group described as smart but dangerous. Were the COSEP hypothesis valid, failure to grade for dangerous answers would permit this group of physicians to acquire board certification yet practice medicine dangerously. It is unlikely that sufficient information about subsequent practice patterns of such examinees could be obtained in a short enough period of time to substantiate the hypothesis.

The ABA oral examination by design and construction is believed to provide a more sensitive and direct assessment of current practice patterns and medical judgment than does the written examination. It seemed appropriate, therefore, to test the dangerous answer scoring system in the written examination against performance in the oral examination. Performance of a group of 92 (9 percent) candidates who passed the written examination and selected at least four dangerous answers was analyzed separately from that of the 944 passing examinees who selected fewer than four. Eighty-six of the 92 took the oral examination on their first opportunity and performed without significant difference from the oral examinees who had selected less than four dangerous answers, when compared as an entire subgroup or separated into AMG and FMG cohorts. Of more relevance, success on the oral examination was not related to either the absolute number of dangerous answers selected or the relative frequency of their selection. Assignment of "dangerous" behavior to candidates in three of 344 subjective assessments of the 86 oral examinees by their examiners is not excessive in the ABA examination process. A review of comments made about another 86 candidates with the same pass rate in the oral examination showed a similar frequency of references to dangerous thinking and behavior. However, the grading format for the oral examination does not specifically request the examiner to comment on dangerous practices by candidates. If it did, unsafe or dangerous practices might be noted more often for all candidates.

The ratings of the potentially dangerous candidates on the residency clinical competence reports were not different from those for failing candidates with similar numbers of dangerous answers and, parenthetically, from those for all candidates in the examination sample. The absence of criticism in such reports is likely due to the natural attrition of poorly performing residents prior to completion of postgraduate education and to the perception of residency program directors and their clinical competence committees that these reports describe a minimum standard of performance for entrance into the examination system. Truly critical assessment of residents' performance appears to be an internal function of the program.

The design of the present study can be criticized. The candidates were not told prior to testing that incorrect answers and, specifically, incorrect dangerous answers would have negative consequences. Nevertheless, the exercise was intended to detect candidates who believed their dangerous answers were correct. Pursuing only those with a disproportionately high frequency of dangerous answers would likely reduce the risk of including examinees who occasionally selected a dangerous answer by guessing. Further, there were relatively few questions with dangerous answers in the examination (29 of 175 multiple-choice type). This low number of questions directly resulted from three aspects of the exercise: (*a*) although many questions had dangerous answers, retrospective selection permitted using only those that had been chosen by at least one passing candidate, a necessary characteristic for the subsequent analysis; (*b*) the judges were instructed to select only answers which were truly dangerous and not just potentially dangerous; and (*c*) at least half of the judges had to identify the answer as truly dangerous. The authors believe the requirement for all three increased the validity of the subsequent observations.

The higher ratios of dangerous answers to incorrect responses in the entire test and in the dangerous answer subset for passing candidates, at all frequencies of selecting dangerous answers, simply reflect the relatively fewer number of incorrect responses by the passing examinees rather than membership in a uniquely identifiable group. Passing candidates chose less than half the number (1.6) of dangerous answers chosen by failing candidates (3.4). This difference also supports the conclusion that selection of a dangerous answer results primarily from the opportunity to select a dangerous answer by virtue of not knowing the correct answer; that is, selection of a dangerous answer reflects the absence of knowledge rather than a purposeful act. It also appears unlikely to the authors that attempts to identify the "smart but dangerous" candidate by creating dangerous responses prospectively rather than selecting them retrospectively would alter the outcome of this exercise.

In summary, the authors examined the validity of dangerous answer scoring within the limits of assessing concurrent rather than future practice patterns and judgment. No evidence from residency reports on clinical competence or from evaluations of oral examiners was found to relate dangerous clinical practice to frequent selection of dangerous responses. Therefore, implementation of alternate scoring by the dangerous answer format would be unnecessarily punitive and unwarranted.

Relationship of Residents' Emotional Problems, Coping Behaviors, and Gender

Elizabeth H. Young, Dr.P.H.

Abstract—Family medicine residents were studied to test the hypotheses that a higher incidence and greater severity of personal or emotional problems are associated with a higher incidence of maladaptive coping behaviors among women than men residents. Self-report data were collected from 466 residents in six states on personal or emotional problems and on alcohol use, cigarette smoking, weight, diet, and exercise. The study provides evidence that the women residents experienced a higher incidence and greater severity of personal or emotional problems than men and that these problems were associated with an increased percentage of women than men who had used alcohol during the preceding year, had used alcohol daily, had increased use of alcohol over the two years before the survey, and had had perceptions of being overweight and were on calorie restricted diets. The gender differences in cigarette smoking and frequency of exercise were not significant. The author concludes that residency programs need to provide flexible programs that would better accommodate women's needs and to help residents develop healthy strategies for dealing with stress.

Studies that address the psychological well-being of family medicine residents suggest that residents experience considerable occupational stress and personal strain during the training program and feel they lose control over their environment and have inadequate social-support systems (1–4). Sources of occupational stress are frequently defined in terms of role conflicts such as role overload, role insufficiency, role ambiguity, role boundary, and role responsibility (1). Fatigue, lack of leisure time, isolation from life outside the hospital, and ambivalence about their career choice are problems associated with the physical environment in which they work (4). The hypothesis that the residency program itself is a pronounced source of stress because it produces in the residents feelings of loss of control over their environment is supported in one of the studies (3). All of these studies focused on differences in sources of stress and the effects of stress on residents at different levels of training or in comparison with faculty members, but the studies did not explore gender differences.

The effects of residency training on the personal and professional lives of residents during the first year of residency training were the focus of other studies (5–7). The incidence of major depression was found to be significantly higher than expected among first-year residents (5). Risk factors for major depression were

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identified as having a history of major depression, being female, and being unmarried. Anger was reported to increase during the year, and sleep deprivation was constant throughout. Time pressures, fatigue, lack of self confidence, and lack of social support were also identified as problems more acutely felt during the first year than in subsequent years of residency training (6).

Women family medicine residents reported higher levels of stress than their male colleagues in reports of a Canadian study (7, 8). Problems in combining a personal and professional life were most frequently cited as sources of stress. Internal medicine program directors reported that leaves of absence granted to residents because of emotional impairment occurred twice as frequently among women as men; however, less than 2 percent of the residents were reported to require this type of leave (9).

Measures of psychological functioning among students at one medical school indicated that there were no gender differences in the students' psychological adjustment on admission to medical school but that by mid-year women students were found to receive less family support for their decision to pursue a medical career and to experience more internal conflict about their decision (10). Other studies indicated that women medical students found it harder to make friends because of responsibilities outside their training than did the men students, felt more isolated from other people than men students, and had greater difficulty meeting people with similar interests (11, 12). Studies of practicing physicians indicated that fewer women physicians were married and fewer had children than did men physicians (13, 14).

The evidence that women may experience more occupational stress and personal strain than men during their formative years in medicine deserves to be studied more thoroughly among larger and more varied populations than previous studies have done. Questions of major interest that were not adequately answered in previous studies were the focus of the investigation reported here. The following hypotheses were tested in the present study. Are there significant gender differences in the incidence of personal or emotional problems among family medicine residents? Are there significant gender differences in behaviors that are considered maladaptive coping mechanisms, such as cigarette smoking, increased alcohol use, excessive calorie intake, and infrequent exercise? Are these maladaptive behaviors related to the incidence and severity of the problems?

Method

The study population was composed of family medicine residents who were receiving their training in the six states of the south-central region of the United States—Missouri, Kansas, Oklahoma, Arkansas, Louisiana, and Texas. Questionnaires were sent in 1985 to the 781 family medicine residents in university-administered or university-affiliated training programs in these six states. These programs were categorized as three types: community-based, university-affiliated; community-based, university-administered; university-based.

The survey items on behavior were adapted from the questions used in the National Survey of Personal Health Practices and Consequences (15) conducted by the U.S. Department of Health and Human Services, because these questions had been extensively field-tested. The questions were designed to elicit information regarding the incidence and severity of personal or emotional problems during the preceding year; health practices related to smoking, alcohol use, exercise, and diet; and demographic characteristics.

The presence of personal or emotional problems was assessed by a bivariate response of yes or no; the items that dealt with frequency of health practices were measured on 3-, 4-, or 5-point Likert-type scales.

The respondents were assured that all responses would be treated as confidential information. A three-stage follow-up method of personal correspondence (that is, addressed specifically to each individual) was used to optimize the response rate. The original questionnaire was accompanied by a personal letter that explained the purpose of the study and included an addressed, stamped envelope for return. One week later a follow-up postcard served to thank those who had replied promptly and to offer a reminder to those who had not. A replacement questionnaire and a second personal letter were sent three weeks after the original to those who had not replied. A final replacement questionnaire and letter were sent seven weeks after the original mailing to nonrespondents.

Results

A total of 466 family medicine residents responded to the survey (60 percent). There were no significant differences in response rate by gender, postgraduate year of training, type of training program, or state. The gender distribution of the respondents very closely approximated the distribution in the study population: 78 percent of the responders were men, and 80 percent of the study population were men. These differences were not statistically significant.

Some demographic characteristics of the respondents by gender are shown in Table 1. There were no significant differences in age between men and women residents. The mean age of respondents was 29.4 years for men and 29.2 years for women. Although there were differences in the total number of women residents at each level of training, the percentage

TABLE 1

Number and Percentage of 466 Responding Residents in 33 Family Medicine Residency Programs in Six States in the South Central Region by Postgraduate Year of Training and Type of Program, 1985*

Year and Program	Men		Women	
	No.	Percent	No.	Percent
Postgraduate year				
1	118	32.4	37	35.9
2	124	34.1	29	28.2
3	121	33.5	37	35.9
Type of Program				
Community-based, university-affiliated	133	36.6	23	22.0
Community-based, university-administered	102	29.2	35	34.0
University-based, university-administered	128	35.2†	45	44.0†

* The six states were Missouri, Kansas, Oklahoma, Arkansas, Louisiana, and Texas.

† Significantly more women were in university-based programs than in community-based programs ($p = .02$).

distribution of women among each of the three years of training was approximately equal to that of the men residents. There was, however, a significant difference in the distribution of women residents among the three types of training programs. Women residents were significantly more likely to receive their training in university-based programs than in either of the two types of community-based programs.

PERSONAL OR EMOTIONAL PROBLEMS

The residents were asked whether they had experienced personal, emotional, behavioral, or mental problems that concerned them in the preceding year. A significantly higher percentage of women residents than men, 64.1 versus 50.7 percent, reported that they had (chi-square = 5.75, df = 1, *p* = .02). The residents who answered "no" were asked to indicate whether they had experienced no problems at all or no severe problems. Those who responded that they had experienced problems were asked to indicate whether their problems were not severe, moderately severe, or severe enough for them to need professional help. A significantly higher percentage of the women than men (17 versus 10 percent, respectively) considered their problems to be severe enough to require professional help, as shown in Table 2.

The hypothesis that first-year residents have a higher incidence, greater severity, and greater need for professional help with personal or emotional problems than their upper-level colleagues was not supported by the data in the study. These findings were somewhat surprising to the author, since, on the basis of previously cited studies, first-year residents would be more likely to experience such problems and might have a greater need for professional help in dealing with them.

Age was not a significant variable in explaining differences in incidence and severity of problems or need for professional help, nor were type of program or

TABLE 2

Number and Percentage of Incidence and Severity of Personal or Emotional Problems and Need for Professional Help of 466 Family Medicine Residents in 33 Residency Programs in Six States, 1985*

Characteristics	Men		Women	
	No.	Percent	No.	Percent
Presence of personal problems during preceding year				
Yes	181	50.7†	66	64.1†
No	176	49.3	37	35.9
Severity of problems				
No problems at all	64	17.9†	11	10.5†
No severe problems	112	31.4	26	25.4
Moderately severe problems	145	40.7	48	47.1
Severe enough to require professional help	36	10.0†	18	17.0†

* The six states were Missouri, Kansas, Oklahoma, Arkansas, Louisiana, and Texas. The number of responses ranged from 428 to 460 because not all residents answered all questions.

† Significant differences ($p = .05$).

location of the program. Gender remained the only significant variable in explaining variance in the three measures (problems in preceding year, health practices, and demographic information) related to personal or emotional problems.

ALCOHOL USE

Data regarding the residents' use of alcohol—including whether alcohol was ever used and the frequency, quantity, and patterns of its use—are shown in Table 3. A significantly higher percentage of the women residents reported using alcoholic beverages than did men residents: 92 percent of women versus 84.1 percent of men. A higher percentage of the women residents reported daily use of alcohol (4.9 percent) than did their male colleagues (1.9 percent). These gender differences in frequency of alcohol use approached statistical significance ($p = .10$). Analysis of variance revealed that frequency of alcohol use was significantly higher among residents in university-based programs than other programs when the analysis controlled for gender differences and postgraduate year ($F = 3.27$, df = 2; $p = .04$). The women residents, however, were significantly more likely than the men to limit their alcohol intake to one or two drinks per occasion.

The residents were asked whether there had been changes in the pattern of their alcohol use within the preceding two years. The results showed that 41.6 per-

TABLE 3

Number and Percentage of 466 Family Medicine Residents in 33 Residency Programs in Six States with Characteristics of Alcohol Use, 1985*

Characteristics	Men		Women	
	No.	Percent	No.	Percent
Used alcohol within preceding year				
Yes	301	84.1†	92	92.0†
No	57	15.9†	8	8.0†
Frequency of use				
Daily	7	1.9†	5	4.9†
2 to 6 days a week	84	23.1	19	18.6
Once a week or less	215	59.2†	70	68.6†
None	57	15.7†	8	7.8†
Amount of alcohol used per occasion of use				
5 or more drinks	3	1.0	1	1.0
3 to 4 drinks	46	13.0†	8	7.8†
1 to 2 drinks	247	69.9†	85	83.3†
None	57	16.1†	8	7.8†
Pattern of use				
More than two years before	31	8.7†	18	17.6†
Same as two years before	120	33.7†	52	51.0†
Less than two years before	148	41.6†	24	23.5†
None	57	16.0†	8	7.8†

* Number of responses ranged from 455 to 465 because not all residents answered all questions.

† Significant difference ($p = .05$).

cent of the men residents reported using less alcohol than two years before versus only 23.5 percent of the women. The women's pattern of use was somewhat more likely to have remained stable over the preceding two years; however, a significantly higher percentage of the women (17.6 percent) than men (8.7 percent) reported using more alcohol than two years before.

A significant association between the incidence of personal or emotional problems and frequency of alcohol use was demonstrated by two-way analysis of variance when the analysis controlled for gender differences ($F = 2.57$, df = 2; $p = .05$). There was also a significant association between the severity of personal and emotional problems and frequency of alcohol use when the analysis controlled for gender differences in the severity of problems ($F = 4.1$, df = 1; $p = .05$). The age of the resident was not a significant variable in explaining the differences in whether alcohol was used or in the quantity or pattern of use. However, age was a significant variable, when the analysis controlled for gender differences, in explaining differences in the frequency of alcohol use ($F = 3.62$, df = 4/395, $p = .007$): the older residents used alcohol more frequently than their younger colleagues.

SMOKING

The incidence of cigarette smoking was very low in both men and women residents. Less than 5 percent of the residents smoked at the time of the survey: 4.1 percent of men and 4.9 percent of women. These gender differences in smoking approached statistical significance ($p = .11$). More of the women than the men reported they had never smoked (86.4 percent versus 77.4 percent). The women who smoked were significantly older than their nonsmoking women colleagues and older than their male colleagues who smoked ($F = 5.12$, df = 2; $p = .001$). The mean age of the women smokers was 32.6 years versus 28.9 years among women who had never smoked. The mean age of men who smoked was 29.6 years and did not differ significantly from that of the men who had never smoked. A significant association between personal or emotional problems and cigarette smoking was demonstrated by partial correlation coefficients, controlled for both age and gender ($r = .12$, $p = .02$). Although the link between personal or emotional problems and cigarette smoking was identified in this study population, the gender differences in rates of smoking were not significant.

WEIGHT

The residents were asked whether they considered themselves to be overweight, underweight, or about average. These terms were not further defined, and, therefore, the responses represent the residents' own perceptions of ideal personal weight. Significantly more women than men considered themselves to be overweight: 46.6 percent versus 33.6 percent (chi-square = 8.65, df = 2; $p = .001$). A significantly higher percentage of the women than the men reported limiting their calorie intake, 86.6 percent versus 62.8 percent (chi-square = 10.2, df = 1; $p = .001$).

A significant association between personal or emotional problems and efforts to limit calories, when the analysis controlled for gender differences in the incidence of personal problems, was demonstrated by analysis of variance ($F = 8.09$, df = 2; $p = .001$). The women who reported having personal or emotional problems were significantly more likely to make efforts to reduce their calorie intake than the men who reported having such problems.

EXERCISE

The results indicated that approximately 12 percent of the residents believed they got enough exercise. Less than 10 percent considered themselves to be much more active than others their same age and gender. Approximately 3 percent of the respondents reported exercising daily, and approximately 30 percent exercised as frequently as two times a week. The remaining 65 percent reported engaging in aerobic exercise once a week or less. There were no significant gender differences in frequency of exercise. In fact, the frequency with which the men and women residents engaged in aerobic exercise was remarkably similar.

Discussion

Do women family medicine residents experience more personal or emotional problems during their residency training than their male colleagues? The responses from the sample of 466 family medicine residents in the study reported here suggest that they do. Significantly more of these women residents reported they had experienced personal or emotional problems during the preceding year than did their male colleagues. And, although the women reported a higher incidence of problems, both the women and men reported a very high incidence of personal or emotional problems during the preceding year: 64.1 percent of the women and 50.7 percent of the men.

More disconcerting to the investigator than the large percentage who reported having problems were the findings that one in six of the women residents and one in 10 of the men residents considered their problems to be severe enough to need professional help. These proportions represent a significantly greater difference in perceived severity of the problems between women and men residents and is considerably higher for both than would be expected in the general population. National survey data (15) indicated that only 5.2 percent of women and 4.9 percent of men experienced personal or emotional problems they considered severe enough to require professional help. It is recognized that there may be gender differences in help-seeking behavior and that women may be somewhat more likely than men to seek professional help. However, the author of the present study believes that the gender differences found in her study represent a true gender difference in both incidence of personal or emotional problems and the degree of severity of the problems. Women residents function in what remains a male-dominated field. Many have assumed multiple roles as physician, wife, mother, colleague, and other important societal roles. Yet the societal norms of women as care-givers, nurturers, and primary parent often seem to be at cross purposes with the goals of medical education.

The question of whether women family medicine residents are at increased risk for maladaptive coping behaviors for dealing with increased incidence and severity of personal or emotional problems cannot be answered definitively on the basis of the present study. However, the findings do point to some causes for concern. The gender differences in the percentage of residents who used alcohol in the preceding year, the increased use of alcohol by women residents over the two years prior to the survey, and the higher incidence of daily use of alcohol by women than men residents must be taken seriously. The significant association between increased incidence of personal or emotional problems and greater frequency of alcohol use supports the hypothesized link between emotional problems and maladaptive coping behaviors related to alcohol use. This statistical association between emotional problems and alcohol use was still present when the incidence of personal problems was controlled for gender differences by analysis of variance.

The data from this study demonstrate an association between an increased incidence of personal or emotional problems and cigarette smoking for both genders. Since the differences in rates of smoking by gender did not differ significantly, an association between increased incidence of personal or emotional problems among women residents and increased cigarette smoking by women could not be demonstrated. These findings suggest that residents' smoking behavior may serve as something of a barometer of their personal or emotional problems even though it is not possible to state which precedes the other.

Almost half of the women considered themselves to be overweight whereas only about one-third of the men had similar concerns. The hypothesized relationship between a higher incidence of personal or emotional problems and weight-reducing behavior or continued efforts to reduce their calorie intake by women residents was supported by analysis of variance. The high number of women who reported limiting their calorie intake (80.6 percent) seems to indicate a preoccupation with weight control that exceeds the norm in a general population.

The findings support the conclusion that neither men nor women residents use frequent exercise as a means of dealing with personal or emotional problems. Since there were no significant differences in amount or type of exercise by gender, the hypothesized relationship between an increased incidence of emotional problems and infrequent exercise among women residents was not supported.

The significant findings presented here point out the usefulness of conceptualizing the relationship between stress-related problems among family medicine residents and the potential for maladaptive coping strategies. Identifying effective coping strategies that would not place the individual at increased risk for substance abuse or other health problems should be incorporated into the residency education program. Such efforts require action rather than mere words of encouragement or crisis management of individual problems as they arise.

Assistance from faculty members in reducing erratic work schedules and sleep deprivation would be beneficial, as would increased social support from both faculty members and peers. Reducing the work load by reducing the number of patients seen by residents and shortening the working hours per day to nine or fewer, would be especially useful to women residents. More flexibility in the operation of residency programs, such as providing for longer maternity leaves or shared residency positions, should be offered in an effort to reduce the risk of maladaptive coping behavior. Assertiveness training should be offered to residents to help them develop skills for dealing with patients who place unreasonable demands on their time. This would be especially appropriate for women residents because the acculturation of many women has encouraged submissiveness rather than assertiveness.

Educational efforts to increase the coping skills of residents should be given a higher priority than at present. All residents could benefit from such training. It is critically important to identify those residents at high risk for personal or emotional problems early in their training and assist them in developing effective coping strategies. If such problems go undetected, the risk of the resident becoming an impaired physician are real. Smoking, misuse of alcohol, overeating, and lack of physical exercise are risks to the physician's health that could be prevented or ameliorated by helping residents develop effective ways of managing stress.

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An AAMC Pilot Study by 10 Medical Schools Of Clinical Evaluation of Students

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Abstract—In 1979 the Association of American Medical Colleges (AAMC) began a Clinical Evaluation Program. In the first phase of the program, AAMC staff members interviewed more than 500 persons in approximately 40 medical schools and solicited responses from clerkship coordinators in six specialties on the problems encountered in evaluating students' clinical performance. These results were published in 1983. The second phase of the program, which is reported on in the present paper, consisted of developing a set of self-assessment instruments in clinical evaluation and testing these instruments by 10 pilot schools. Clinical faculty members and clerkship coordinators in the pilot schools and residents at affiliated hospitals who worked with the students were asked to identify the problems they faced in evaluating students' clinical performance, and these responses were analyzed in terms of the respondents' specialties. The problems identified by the highest percentages of clinical faculty members and residents were: inadequate guidelines for handling problem students, failure to act on negative evaluations, lack of information about problems that students bring with them into clerkships, and faculty members' unwillingness to record negative evaluations. A rank-ordering of these responses on problems showed that different specialties considered different problems to be severe. In rating difficulties in evaluating problem students, the respondents reported that the type of problem student most frequently encountered was one who cannot focus on what is important. Rank-ordering of these responses showed that each type of problem student poses different evaluation difficulties in each specialty. The respondents also identified the problems they had with the evaluation forms used in their departments.

This article was prepared as a companion piece to a paper, "AAMC Program To Promote Improved Evaluation of Students During Clinical Education" (1), that was presented at the National Invitational Conference on the Clinical Education of Medical Students held in 1985 by the Association of American Medical Colleges (AAMC). That paper provided an overview of the AAMC Clinical Evaluation Program and its conclusions within the framework of a systems approach to evaluation. The present article furnishes the reference data that should aid individual schools in adopting the

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systems approach and in reviewing their evaluation policies and practices using self-assessment instruments available from the AAMC. This paper should serve as a reference work for curriculum and promotion committees, deans for academic and student affairs, clerkship directors, and educational researchers.

Background

The Clinical Evaluation Program, begun in 1979 by the AAMC, was a response to a growing concern on the part of clinical faculty members with their role as evaluators of medical students. During the first phase of the project, this concern was defined, validated, and documented through two approaches. First, interviews were conducted by AAMC staff members with more than 500 persons in approximately 40 medical schools. Second, a letter of inquiry regarding obstacles to effective and efficient evaluation of clerks was distributed to 640 clerkship coordinators in six specialties. Responses from a total of 519 clerkship coordinators and clinical faculty members were received to this inquiry. The results of the interviews and of the survey were summarized in 1983 in two publications (2, 3).

In the second phase of the project, AAMC staff members worked with a 13-member Program Advisory Group, chaired by Daniel D. Federman, M.D., Harvard Medical School, to develop a set of self-assessment instruments. These instruments were designed to enable medical schools and clinical departments to: (*a*) describe the formal and informal structure of their evaluation systems, (*b*) assess the strengths and weaknesses of those systems, (*c*) determine the level of satisfaction with the systems by those involved in their implementation, and (*d*) decide on needed changes.

Ten medical schools were selected to participate in the pilot study of these materials in three cycles of review and revision. These schools and the corresponding number of respondents at each were: University of California, Los Angeles, UCLA School of Medicine (70); University of California, San Francisco, School of Medicine (79); University of Cincinnati College of Medicine (69); Jefferson Medical College of Thomas Jefferson University (25); Louisiana State University School of Medicine in New Orleans (50); McMaster University School of Medicine (110); University of Oklahoma College of Medicine (121); University of Pennsylvania School of Medicine (68); Uniformed Services University of the Health Sciences F. Edward Hébert School of Medicine (30); and University of Washington School of Medicine (470). The total number of respondents was 1,092. Participation by specialty consisted of 358 in internal medicine, 204 in pediatrics, 108 in surgery, 110 in psychiatry, 200 in obstetrics-gynecology, 40 in family medicine, and 29 in other specialties.

Project coordinators at each school selected the self-assessment materials that they were interested in testing and developed a schedule mutually agreeable to the school and to the AAMC. Thus, not all schools tested all instruments. The final set of self-assessment materials tested were: (*a*) "Description of Structure and Function for the Dean's Office and for Clinical Departments"; (*b*) "System Problem Checklist for the Dean's Office, for Clerkship Coordinators, and for Clinical Faculty"; (*c*) "Problem Student Checklist for the Dean's Office, for Clerkship Coordinators, and for Clinical Faculty"; and (*d*) "Evaluation Content Checklist for Clerkship Coordinators and for Clinical Faculty."

The data presented in the present report were derived from the studies conducted by the 10 pilot schools from 1984 to 1986. The publication of this report and two others addressing the systems approach to evaluation concludes the second phase of the AAMC program (4, 1). All of the self-assessment materials reported on here have been integrated into the AAMC Management Education Program Workshop Series entitled "Systems for the Evaluation of Clinical Students: An Institutional Management Approach." During 1986, 26 medical schools participated in the workshops.

Systems Approach to Evaluation

The underlying tenet of the systems approach is that evaluation is not merely, or even primarily, a psychometric task but rather is a task that involves several interacting elements—evaluators, students, content, methods, and environment. Whereas methods of evaluation have long been subjects of intense interest and investigation, it is the other components, often overlooked, that are the key to an efficient and effective evaluation system.

Evaluators should be integrated into the system based upon their level of interest in and experience with the task and upon the type of opportunity they have to assess students. Clinical faculty members should be aware of the types of problem students that they will encounter and

TABLE 1

Numbers and Percentages of 872 Clinical Faculty Members and Residents at 10 Pilot Schools Who Rated the Seriousness of 14 Common Problems in Their Clinical Evaluation of Students, 1984–85

Problem	No. of Respondents*	Serious Problem		Problem		No Problem	
		No.	Percent	No.	Percent	No.	Percent
Inadequate guidelines for handling problem students	860	316	36.7	343	39.9	201	23.4
Lack of information about problems students bring with them into the rotation	863	300	34.8	349	40.4	214	24.8
Faculty members' unwillingness to record negative evaluations	860	297	34.5	344	40.0	219	25.5
Failure to act on negative evaluations	828	303	36.6	255	30.8	270	32.6
Lack of training of evaluators	867	224	25.8	377	43.5	266	30.7
Reversal or dilution of negative evaluations	841	211	25.1	295	35.1	335	39.8
Criteria of evaluation insufficiently defined	867	196	22.6	304	35.1	367	42.3
Delays in feedback to students	849	186	21.9	306	36.0	357	42.0
Role as evaluator not clearly defined	868	133	15.3	329	37.9	406	46.8
Insufficient communication with clerkship or site coordinator	863	132	15.3	292	33.8	439	50.9
Tardy submission of required evaluations	853	122	14.3	303	35.5	428	50.2
Insufficient opportunity to observe students directly	870	158	18.2	235	27.0	477	54.8
Excessive reliance on residents for information about students	838	120	14.3	260	31.0	458	54.7
Inadequate evaluation form	866	112	12.9	202	23.3	552	63.7

* A total of 872 persons completed the questionnaire; however, the number of respondents per item varied.

the level of difficulty they will have in diagnosing and managing these students. With this information, the faculty members can identify and acquire resources necessary for remediation.

The methodology employed in assessment should be appropriate for the content of what is being evaluated. The fund of knowledge and the technical aspects of clinical skills can be assessed by objective measures. In contrast, personal and professional qualities and more complex cognitive and clinical skills demand observation over extended periods and inevitably involve educated guesses and personal judgment of the evaluator.

A poorly functioning evaluation system can be the result of policy problems (for example, a clerkship in which all students receive honors regardless of performance

TABLE 2

Numbers and Percentages of 96 Clerkship Coordinators at Seven Pilot Schools Who Rated the Seriousness of 22 Common Problems in the Clinical Evaluation of Students, 1984–85

Problem	No. of Respondents*	Serious Problem		Problem		No Problem	
		No.	Percent	No.	Percent	No.	Percent
Faculty members' unwillingness to record negative evaluations	94	38	40.4	36	38.3	20	21.3
Lack of early-warning system regarding problem students	94	41	43.6	30	31.9	23	24.5
Breakdown in transmission of information across rotations and clerkships	85	37	43.5	23	27.1	25	29.4
Lack of training of evaluators	94	33	35.1	40	42.6	21	22.3
Tardy submission of required evaluations	92	25	27.2	43	46.7	24	26.1
Criteria of evaluation insufficiently defined	96	28	29.2	37	38.5	31	32.3
Inadequate guidelines regarding repeaters	90	29	32.2	27	30.0	34	37.8
Reversal or dilution of negative evaluations	90	23	25.6	35	38.9	32	35.6
No follow-up of effectiveness of remediation	86	20	23.3	31	36.0	35	40.7
Lack of agreement among evaluators	89	15	16.9	42	47.2	32	36.0
Failure to act on negative evaluations	91	24	26.4	24	26.4	43	47.3
Lack of integration of information about the student from various sources	96	12	12.5	46	47.9	38	39.6
Delays in feedback to students	92	13	14.1	39	42.4	40	43.5
Lack of integration of information about the student over time	93	14	15.1	37	39.8	42	45.2
Inadequate guidelines regarding temporary or conditional grades	93	16	17.2	32	34.4	45	48.4
Lack of correspondence between grades and narrative evaluation	91	15	16.5	32	35.2	44	48.4
Inadequate evaluation form	94	12	12.8	28	29.8	54	57.4
Inappropriateness of remedy applied to problems identified in students	83	12	14.5	20	24.1	51	61.4
Underutilization of existing counseling system	85	8	9.4	26	30.6	51	60.0
Excessive reliance on residents for information about students	80	9	11.3	20	25.0	51	63.8
Paucity of counseling options	91	8	8.8	25	27.5	58	63.7
Insufficient support from administration for the evaluative process	94	9	9.6	20	21.3	65	69.1

* A total of 96 persons completed the questionnaire; however, the number of respondents per item varied.

TABLE 3

Rank Order of Severity of 14 Common Problems in Clinical Evaluation of Students, Based on the Ratings of Seriousness of Each Problem by 872 Clinical Faculty Members and Residents at 10 Pilot Schools, by Specialty, 1984–85*

Problem	All ($n = 872$)	Internal Medicine ($n = 301$)	Surgery ($n = 91$)	Pediatrics ($n = 184$)	Psychiatry ($n = 95$)	Obstetrics-Gynecology ($n = 160$)
Inadequate guidelines for handling problem students	1	2	2	1	1	2
Lack of information about problems students bring with them into the rotation	2	4	3	4	2	1
Faculty members' unwillingness to record negative evaluations	3	1	5	3	3	8
Failure to act on negative evaluations	4	3	1	2	5	5
Lack of training of evaluators	5	6	7	5	4	3
Reversal or dilution of negative evaluations	6	5	6	6	7	12
Criteria of evaluation insufficiently defined	7	9	8	7	6	4
Delays in feedback to students	8	7	4	8	9	6
Role as evaluator not clearly defined	9	11	11	10	8	10
Insufficient communication with clerkship or site coordinator	10	8	13	11	11	11
Tardy submission of required evaluations	11	12	10	12	10	7
Insufficient opportunity to observe students directly	12	13	9	9	13	9
Overreliance on residents for information about students	13	10	12	13	14	13
Inadequate evaluation form	14	14	14	14	12	14

* In the rank order, 1 = most severe and 14 = least severe problem. The rank order was based on the respondents' rating of each problem on a 3-point scale.

or an institutional commitment to minority admissions with no subsequent support for minority students who enter), structure problems (lack of adequate support staff for the evaluation process; inadequate monitoring of remote educational sites), personnel problems (known bias of evaluators; poor ability of evaluators to reconcile their roles as mentors and judges), or information flow problems (lack of clear guidelines regarding next steps to be taken after identification of a problem student; valuable evaluative information received too late to be integrated into a composite evaluation of the student).

The changing environment in which clinical education takes place should be monitored, and teaching and evaluation policies and practices should be modified as necessary to accommodate the changes. Also, research in evaluation should be examined to find practical applications that can be integrated into an evaluation system.

Analysis of Clinical Evaluation

The clinical faculty members and clerkship coordinators from the 10 pilot schools and residents at affiliated hospitals who worked with the students were asked to identify the problems they faced

TABLE 4

Rank Order of Severity of 22 Common Problems in Clinical Evaluation of Students, Based on the Ratings of Seriousness of Each Problem by 96 Clerkship Coordinators at Seven Pilot Schools, by Specialty, 1984–85*

Problem	All ($n = 96$)	Internal Medicine ($n = 27$)	Surgery ($n = 9$)	Pediatrics ($n = 12$)	Psychiatry ($n = 9$)	Obstetrics-Gynecology ($n = 14$)
Faculty members' unwillingness to record negative evaluations	1	1	3	3	3	13
Lack of early-warning system regarding problem students	2	2	1	9	8	1
Breakdown in transmission of information across rotations and clerkships	3	5	5	5	5	7
Lack of training of evaluators	4	6	15	2	2	2
Tardy submission of required evaluations	5	3	8	7	4	8
Criteria of evaluation insufficiently defined	6	15	6	1	1	5
Inadequate guidelines regarding repeaters	7	8	2	4	10	14
Reversal or dilution of negative evaluations	8	4	5	15	6	16
No follow-up of effectiveness of remediation	9	9	9	10	12	10
Lack of agreement among evaluators	10	11	17	6	13	3
Failure to act on negative evaluations	11	7	13	17	15	19
Lack of integration of information about the student from various sources	12	14	11	8	16	6
Delays in feedback to students	13	13	22	16	17	4
Lack of integration of information about the student over time	14	12	16	11	9	9
Inadequate guidelines regarding temporary or conditional grades	15	16	14	14	11	21
Lack of correspondence between grades and narrative evaluation	16	10	7	12	20	15
Inadequate evaluation form	17	18	4	13	18	17
Inappropriateness of remedy applied to problems identified in students	18	17	10	21	21	12
Underutilization of existing counseling system	19	20	19	19	7	22
Excessive reliance on residents for information about students	20	22	21	18	22	11
Paucity of counseling options	21	19	20	20	14	20
Insufficient support from administration for the evaluation process	22	21	18	22	19	18

* In the rank order, 1 = most severe and 14 = least severe problem. The rank order was based on the respondents' rating of each problem on a 3-point scale.

in evaluating students' clinical performance, and these responses were analyzed in terms of the respondents' specialties. The respondents were asked the frequency with which they encountered different types of problem students and the amount of difficulty they had in identifying and managing these students. They were also asked to assess the adequacy of the evaluation forms they used.

EVALUATION PROBLEMS

A total of 872 clinical faculty members and residents at the schools were individually presented with a list of 14 common clinical evaluation system problems and asked, based on their experience, to consider whether each item was a serious problem, a problem, or no problem in the evaluation of medical students' clinical performance. The responses are displayed in Table 1. The problems that 25 percent or more of the respondents endorsed as serious were: inadequate guidelines for handling problem students, failure to act on negative evaluations, lack of information about problems that students bring with them into the rotation, faculty members' unwillingness to record negative evaluations, lack of training of evaluators, and reversal or dilution of negative evaluations.

A total of 96 clerkship coordinators at seven of the 10 schools were given the

TABLE 5

Numbers and Percentages of 891 Clerkship Coordinators, Clinical Faculty Members, and Residents at Eight Pilot Schools Who Rated the Frequency with Which They Encountered 21 Types of Problem Students, 1984–85

Type of Problem Student	No. of Respondents*	Frequently		Occasionally		Rarely	
		No.	Percent	No.	Percent	No.	Percent
Cannot focus on what is important	885	197	22.3	559	63.2	129	14.6
Has a poor fund of knowledge	882	142	16.1	587	66.6	153	17.3
Disorganized	887	161	18.2	550	62.0	176	19.8
Has poor integration skills	885	137	15.5	547	61.8	201	22.7
Excessively shy, nonassertive	888	125	14.1	554	62.4	209	23.5
Overeager	884	146	16.5	493	55.8	245	27.7
Bright but has poor interpersonal skills	887	57	6.4	538	60.7	292	32.9
Uninterested	886	47	5.3	415	46.8	424	47.9
Too casual and informal	890	43	4.8	413	46.4	434	48.8
Avoids work	887	23	2.6	402	45.3	462	52.1
Challenges everything	889	21	2.4	380	42.7	488	54.9
"Does not measure up" intellectually	884	20	2.3	367	41.5	497	56.2
"All thumbs"	869	14	1.6	293	33.7	562	64.7
Avoids patient contact	881	11	1.2	258	29.3	612	69.5
"Con artist"	875	10	1.1	215	24.6	650	74.3
Rude	847	20	2.4	166	19.6	661	78.0
Hostile	884	3	0.3	167	18.9	714	80.8
Cannot be trusted	867	11	1.3	143	16.5	713	82.2
Does not show up	876	4	0.5	147	16.8	725	82.8
Has a psychiatric problem	881	4	0.5	128	14.5	749	85.0
Has a substance-abuse problem	855	2	0.2	36	4.2	817	95.6

* A total of 891 persons completed the questionnaire; however, the number of respondents per item varied.

same task for a list of 22 common clinical evaluation system problems. The list included the 14 items presented to clinical faculty members and eight additional items that addressed the clerkship coordinators' role as managers of the clerkship experience. These responses appear in Table 2. The problems that 30 percent or more of the coordinators considered serious were: lack of early-warning system regarding problem students, breakdown in transmission of information across rotations and clerkships, faculty members' unwillingness to record negative evaluations, lack of training of evaluators, and inadequate guidelines regarding repeaters (that is, clerks who failed a rotation previously).

The 10 problems identified by the faculty members, residents, and clerkship coordinators fall into three categories: (*a*) communication among faculty members, (*b*) faculty attitudes and perceptions, and (*c*) technical aspects of the evaluation system (4). The systems approach is valuable in highlighting tasks necessary to address the problems within the categories. Improving the flow of information within and among all components of the system is one such task. Improved communication also helps to dispel misperceptions and to modify attitudes of faculty members. Making available guidelines, training programs, and evaluation instruments addresses the technical requirements of the system and enhances communication.

Specialty-specific responses regarding the severity of the 14 evaluation system problems were examined for five clerkships: internal medicine, surgery, pediatrics, psychiatry, and obstetrics and gynecology. In order to compare responses across the five specialties, a decreasing rank order of problem severity was determined for each specialty based upon calculations of average responses. These rank orders are found in Table 3. Differences appear across the specialties in the order of severity of each of the 14 problems. The most serious problem in the clinical evaluation of students in internal medicine was faculty members' unwillingness to record negative evaluations; in surgery, failure to act on negative evaluations; in pediatrics and in psychiatry, inadequate guidelines for handling problem students; and in obstetrics and gynecology, lack of information about the problems that students bring with them into the rotation.

Differences in the rank order across specialties were more pronounced for the 22 problems assessed by the clerkship coordinators. These rank orderings are displayed in Table 4. The most serious evaluation problem for coordinators in internal medicine was faculty members' unwillingness to record negative evaluations; in surgery and in obstetrics and gynecology, it was lack of an early-warning system regarding problem students; and in pediatrics and in psychiatry, the most serious problem was the insufficient definition of evaluation criteria.

PROBLEM STUDENTS

Clerkship coordinators, clinical faculty members, and residents at eight of the 10 pilot schools were asked to indicate the frequency of encountering each of 21 types of problem students. The responses of 891 persons who completed the instrument are displayed in Table 5. The type of problem student encountered most often was one who cannot focus on what is important, the disorganized student, the overeager student, and the student with a poor fund of knowledge.

Specialty-specific responses on the frequency of encountering problem students were examined for five clerkships: internal medicine, surgery, pediatrics, psychiatry, and obstetrics and gynecology. In or-

TABLE 6

Rank Order of the Frequency of Encountering 21 Types of Problem Students, Based on the Ratings of Frequency for Each Type by 891 Clerkship Coordinators, Clinical Faculty Members, and Residents at Eight Pilot Schools, by Specialty, 1984–85*

Type of Problem Student	All (*n* = 891)	Internal Medicine (*n* = 319)	Surgery (*n* = 96)	Pediatrics (*n* = 163)	Psychiatry (*n* = 93)	Obstetrics-Gynecology (*n* = 162)
Cannot focus on what is important	1	1	1	1	3	3
Has a poor fund of knowledge	2	3	2	3	4	5
Disorganized	3	2	3	2	8	4
Has poor integration skills	4	4	6	6	2	6
Excessively shy, nonassertive	5	5	4	5	5	2
Overeager	6	6	5	4	6	1
Bright but has poor interpersonal skills	7	7	7	7	1	8
Uninterested	8	10	8	8	8	9
Too casual and informal	9	8	9	9	12	11
Avoids work	10	11	12	11	9	12
Challenges everything	11	12	11	10	11	13
"Does not measure up" intellectually	12	9	10	12	13	14
"All thumbs"	13	14	13	13	20	10
Avoids patient contact	14	13	16	14	10	18
"Con artist"	15	16	14	15	18	15
Rude	16	15	15	17	14	17
Hostile	17	18	17	19	16	16
Cannot be trusted	18	17	18	18	19	7
Does not show up	19	20	19	16	17	19
Has a psychiatric problem	20	19	20	20	15	20
Has a substance abuse problem	21	21	21	21	21	21

* In the rank order, 1 = most frequently encountered and 21 = least often encountered. The rank order was based on the respondents' rating of each problem student on a 3-point scale.

der to compare responses across the five specialties, a decreasing rank order of the frequency of encounter was determined for each specialty based upon calculations of average responses. These rank orders are presented in Table 6. Many differences are evident across the specialties in the order of each of the 21 types of problem students. The most frequently encountered problem student in internal medicine, in surgery, and in pediatrics was the student who cannot focus on what is important; in psychiatry, it was the bright student with poor interpersonal skills; and in obstetrics and gynecology, it was the overeager student.

Respondents were also asked to indicate for each type of student whether they, as evaluators, found it difficult to identify and manage that type of problem student. The responses of 891 clerkship coordinators, clinical faculty members, and residents at eight of the 10 schools were examined by specialty. Table 7 presents the rank order of problem students with respect to difficulty in diagnosis and management in each of the five specialties. Differences across the five specialties indicate that each type of problem student poses different evaluation difficulties in each specialty.

EVALUATION FORMS

The clerkship coordinators, clinical faculty members, and residents were asked to assess the adequacy of the evaluation

TABLE 7

Rank Order of the Difficulty of Identifying and Managing 21 Types of Problem Students, Based on the Ratings of Difficulty of Each Type by 891 Clerkship Coordinators, Clinical Faculty Members, and Residents at Eight Pilot Schools, by Specialty, 1984–85*

Type of Problem Student	All (n = 891)	Internal Medicine (n = 319)	Surgery (n = 96)	Pediatrics (n = 163)	Psychiatry (n = 93)	Obstetrics-Gynecology (n = 162)
Has a psychiatric problem	1	2	1	1	2	1
Shy, nonassertive	2	1	2	2	1	2
"Con artist"	3	3	4	4	3	3
Has a substance-abuse problem	4	5	3	3	4	4
Bright but has poor interpersonal skills	5	4	5	5	6	5
Challenges everything	6	6	16	7	8	7
Has poor integration skills	7	7	6	6	9	12
Cannot be trusted	8	12	9	10	5	6
Hostile	9	10	12	11	7	9
Cannot focus on what is important	10	11	7	8	13	11
"Does not measure up" intellectually	11	8	14	12	11	10
Avoids patient contact	12	9	8	16	15	8
Uninterested	13	14	11	14	10	14
Too casual and informal	14	13	17	9	18	13
Overeager	15	16	10	13	12	17
"All thumbs"	16	15	18	17	17	15
Disorganized	17	18	15	15	21	16
Has a poor fund of knowledge	18	17	13	18	20	19
Avoids work	19	19	19	19	19	20
Does not show up	20	21	20	20	16	21
Rude	21	20	21	21	14	18

* In rank order, 1 = most difficult to identify and/or manage and 21 = least difficult to identify and/or manage. The rank order was based on the respondents' rating of each type of student on a 3-point scale.

forms they used on a scale of "serious problem," "problem," and "no problem." From a total of 993 respondents, more than one-third (37.2 percent) indicated that an adequate evaluation form was a problem or a serious problem in their respective departments.

Fifteen evaluation forms used to evaluate the clinical performance of third-year medical students in 38 departments at the 10 pilot schools were collected and their content analyzed. The specialties represented by these forms were internal medicine, surgery, pediatrics, psychiatry, obstetrics and gynecology, and family medicine. Using the report of the Working Group on Fundamental Skills from the AAMC study by the Project Panel on the General Professional Education of the Physician and College Preparation for Medicine (5), the staff for the Clinical Evaluation Program developed a schema of several aspects of clinical performance. This framework was used to group all of the items on each of the 15 forms into seven categories: (*a*) specific clinical skills, including history-taking and physical examination, oral and written communication, technical skills, and interpretation of laboratory test results; (*b*) inter-

TABLE 8

Number of 30 Departments at Nine Pilot Schools in Which Each of Seven Categories of Skills Was Included in the Department's Clinical Evaluation Forms and in Which 800 Clinical Faculty Members, Residents, and Clerkship Coordinators Expressed Dissatisfaction with Their Ability To Assess the Skills, 1984–85

Category	Departments		Range of Percentages of Respondents Expressing Dissatisfaction
	No. with Category on Form	No. with Respondents Expressing Dissatisfaction	
Clinical skills	30	25	5.3–44.4
Interpersonal skills	28	23	5.3–62.5
Clinical judgment and/or problem-solving	28	22	3.4–58.3
Knowledge	29	22	3.4–33.3
Physician-related characteristics	30	23	1.3–33.3
Person-related characteristics	22	18	3.5–58.3
Use of literature	10	10	10.3–62.5

personal skills, including relationships with patients, faculty members, staff, and peers, and interest in patients; (*c*) clinical judgment and problem-solving including clinical reasoning, use of resources, diagnostic formulation, and development of a treatment and/or management plan; (*d*) knowledge, including fund of knowledge and application of knowledge; (*e*) physician role characteristics such as responsibility, initiative, attendance, and dependability; (*f*) personal characteristics such as leadership potential, educational initiative, maturity, and understanding; and (*g*) use of the medical literature.

Clerkship coordinators, clinical faculty members, and residents at nine of the 10 schools were given a list of items taken directly from the particular forms used in evaluating third-year students in their departments and asked to indicate, for each item, whether or not they were certain of their ability to assess students on that item. Results from 800 respondents in 30 departments are displayed in Table 8.

The respondents were also asked whether some of the items were not important to evaluate. Sixty respondents (7.5 percent) indicated that this was the case for certain items on their department's form.

The responses suggest a significant degree of dissatisfaction on the part of coordinators, faculty members, and residents with the evaluation forms currently in use at the pilot schools. There was also discomfort with the evaluators' own ability to use effectively many items on these forms. The seven aspects of clinical performance developed by the authors provide a framework for the development of adequate and effective forms for the evaluation of third-year medical students.

Conclusion

From the examination of the data reported here, it is apparent that no school is exempt from evaluation system problems. The problems, however, vary from school to school; in fact, the configuration of a particular set of problems and the context of the environment in which they exist are unique to each school. Specific solutions to particular system shortcomings, therefore, must also differ and cannot be generally prescribed. However, improvement of communications, direct discussion of misperceptions and negative attitudes, and availability of materials, guidelines, and training programs help in the search of effective solutions.

It is hoped that the publication of these nationwide reference data and the availability of the self-assessment instruments through the AAMC Management Education Program Workshop Series (and directly from the AAMC) will encourage schools to undertake self-studies and to share their findings with others.

The comments by one participant (6) in the 1985 AAMC National Invitational Conference on the Clinical Education of Medical Students seem particularly relevant:

> Medical school faculty members have a highly developed sense of what constitutes a good physician. Evaluation systems must help them to feel comfortable in recording their observations about developing physicians just as they feel comfortable in recording their observations about their patients, knowing that they are observations, not necessarily facts. They need to learn to have confidence about their instincts and to recognize their dual roles as mentors and judges. Faculties should not be singled out as the only weak link in the evaluation system; the entire system is at fault and needs improvement. The leadership necessary to do this is in the offices of the deans and department chairs. It also resides in the senior faculty members of each school. Now is the time for these leaders to fulfill their responsibility to solve this important problem.

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Physician Characteristics and Training Emphasis Considered Desirable by Leaders of HMOs

M. Orry Jacobs and Peter D. Mott, M.D.

Abstract—Health maintenance organizations (HMOs) are growing rapidly and employing increasing numbers of physicians. It is important for medical educators to know what such organizations consider important physician traits and training experiences for their recruitment and retention of physicians. A survey of all HMOs in the United States in 1986, to which 44 percent responded, indicated that they want the curriculum of medical school and/or residency programs to have increased emphasis on cost-effective use of diagnostic and treatment services, utilization review and quality assurance, the role of primary care "gate-keeper," and financing of health services. The most important criteria in selection of physicians by HMOs were the physician's board eligibility, motivation, bedside manner, adaptability to a changing environment, the ability to work in a team, training being done in a U.S. medical school, and ability to relate to nonphysician staff members and the reputation of the physician's residency program.

Medical education in the United States is undergoing thorough reevaluation and change, and the restructuring of curricula reflects in part the restructuring taking place in health care delivery. One of the most significant events in this changing environment is the emergence of health maintenance organizations (HMOs), which offer prepaid health care to individuals. Already, more than one-fourth of the physicians not employed by the federal government are salaried employees, many of them in HMOs. Because there will undoubtedly be an increase in the number of physicians working for or contracting with HMOs, the authors conducted a survey to determine the training and characteristics that those organizations desire of their physicians. The results of that survey are reported here.

Background

American medical colleges and academic medical centers are studying and redesigning curricula at a pace not seen since the days following the Flexner report of 1910. Bok (1) called for basic changes in medical education and warned about an imposing list of obstacles to that change. Siu and colleagues (2) reviewed recent curricular changes reported throughout the literature and found many to be "short-term programs . . . not worth pursuing." They suggested, instead, a more radical restructuring of medical education.

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In its landmark report, "Physicians for the Twenty-First Century," the Association of American Medical Colleges in 1984 (3) reviewed the reasons why considerably more needed to be done to adapt the general professional education of medical students to the changes in medical practice. The report considered college, medical school, and residency training years as a unit. It cited rapid advances in biomedical knowledge and technology. The report, however, was equally concerned with environmental factors, the understanding of the importance of life-style, the problems of poverty, and the increasing need for physicians to be able to coordinate a variety of community health services. Moreover, the study pointed to the need to train physicians to handle cost-containment measures and ethical dilemmas. Lastly, it pointed out that the educational establishment should remember that medical graduates increasingly are seeking employment with HMOs and other new forms of practice.

Certain preclinical and clinical subjects have been reported to need greater emphasis in the curriculum. After surveying the current status of the teaching of medical ethics, Culver and colleagues (4) recommended that all schools require basic instruction in several aspects of that subject. Sheps (5) called for further training in an epidemiological approach for all students to link health care to public and individual needs. For example, that author indicated that through this discipline the student will see the importance of gaining knowledge about chronic disease management and geriatrics.

Certain experiences have been advocated as being valuable in training physicians. Many authors have called for an increase in time spent in an ambulatory setting (1, 3, 5). Indeed, the inpatient experience is becoming increasingly atypical of the average medical practice, and some authors call for decreasing the trainee's time in the tertiary-care hospital setting in relation to ambulatory care exposure. Lipkin and colleagues (6) stressed the need to teach interviewing and related psychosocial skills. Kantor and Griner (7) surveyed graduates of a university-based medical residency program, and the graduates reported the need for more training in approaching psychosocial problems and assessing cost-benefit issues.

Whether an appreciation of cost saving through more selective use of diagnostic procedures is best taught as a topic per se (7, 8) or whether it can be expected as a logical outcome of sound clinical reasoning has been debated in the literature. Only 34 percent of U.S. medical schools in 1979 were teaching or planning to teach cost containment as a subject (9).

Other management skills have been described as important. Haggerty (10) stressed the organization of health services in a community, how to assess their strengths and weaknesses, and how to change them. Others called for experience working in health care teams (5, 11), including effective utilization of consultants (8), nurses, and mid-level practitioners (12).

Curricular changes can be expected to help improve the delivery of health services. For example, training primary care specialists to be able to take on the responsibilities of a "gatekeeper," coordinator, or case manager can theoretically improve the care of patients (8). In more organized systems of care, it is possible for the physician to plan and carry out the long-term care of patients and to provide the continuity and oversight that can allow more prevention, better diagnosis, and more efficient management and can avoid unnecessary procedures or over-utilization of hospitals. It is such physician skills and curricular programs that hold the most promise for HMOs.

HMOs are growing rapidly and are now predicted to enroll 50 million subscribers by 1993 (13). Some experts expect that prepaid plans will dominate health care delivery during the next decade. Federal officials openly talk of their strategy to shift Medicare beneficiaries into prepaid plans (14). Indeed, some health care professionals in cities where large proportions of the population participate in HMOs, (such as Minneapolis, Minnesota, and Rochester, New York) already refer to "capitation," rather than fee-for-service, practice as the customary practice. Given the explosive growth in HMOs, it appears likely that HMOs will have an expanding pool of affiliating physicians, either as employees or as participants through contractual agreements.

HMOs have been recruiting physicians since the 1930s, but only recently have they become large-scale employers. In the past, the HMOs' only preferences regarding physicians reportedly were that the physicians be graduates of prestigious medical schools and board-certified in specialties (15).

To determine the physician characteristics HMOs deem important and those that most influence their hiring decisions, the authors conducted a national survey of HMO leaders.

Method

A survey instrument was designed by the authors after they interviewed HMO medical directors in Rochester, New York, to determine the topics and criteria that should be included in the questionnaire. Subsequently, these same individuals were asked to pretest the questionnaire.

A mailing list of HMOs in the United States was obtained from a national nonprofit research firm specializing in HMOs. The survey instrument and stamped, self-addressed envelopes were mailed in February 1986 to all 380 HMOs on the list, including those in the pretest. A total of 168 responses were received, a response rate of 44 percent. A cover letter asked that the survey be directed to the individual responsible for physician selection.

The data received were entered on a microcomputer for analyses. Chi-square tests were used to determine whether the responses varied significantly according to HMO characteristics, such as enrollment size, HMO type (staff, group, independent practice association, and network), and number of years in operation.

Results

The first question asked respondents to indicate the emphasis they thought should be given to 21 areas at some time during the medical education process. Potential responses for rating the areas were: much greater emphasis, somewhat greater emphasis, no change in emphasis, somewhat less emphasis, and much less emphasis. Table 1 presents the percentages of those responding to each area who felt the emphasis should be "much greater" or "somewhat greater." The curricular areas rated as needing much greater or somewhat greater emphasis by 90 percent or more of the respondents were: cost effective use of diagnostic and treatment services, utilization review and/or quality assurance, role of primary care gatekeeper, and financing of health care services. Occupational medicine, epidemiology, emergency medicine, and clinical experience in an inpatient setting had the lowest percentages (less than 45 percent) of respondents who favored increased emphasis.

TABLE 1

Percentages of 168 Leaders of Health Maintenance Organizations Who Felt That Each of 21 Areas of Training Should Receive Greater Emphasis in Medical Education, 1986*

Areas	Much Greater Emphasis	Somewhat Greater Emphasis	Combined
Cost-effective use of diagnostic and treatment services	75	22	97
Utilization review and/or quality assurance	62	34	96
Role of primary care gatekeeper	44	48	92
Financing of health services	46	44	90
Clinical experience in ambulatory setting	33	52	85
Group dynamics	29	54	83
Preventive medicine	35	48	83
Geriatrics	26	55	81
Nutrition	24	52	76
Behavioral sciences	27	47	74
Health education	28	46	74
Working with other health professionals	24	49	73
Working with nurse practitioners or physician assistants	25	47	72
Marketing	15	56	71
Office management	26	43	69
Medical ethics	21	42	63
Rehabilitation	13	46	59
Occupational medicine	6	38	44
Epidemiology	5	33	38
Emergency medicine	3	27	30
Clinical experience in inpatient setting	5	18	23

* Percentages were rounded to the nearest whole number. The number of responses to each item ranged from 148 to 159 because not all respondents rated all items. The possible responses were: much greater emphasis, somewhat greater emphasis, no change in emphasis, somewhat less emphasis, and much less emphasis.

An analysis was performed to determine whether HMO type, enrollment size, or number of years in operation resulted in a statistically different response. While there were some differences in responses by HMO characteristics, the responses for a majority of curricular areas were not statistically different at the 95 percent confidence level.

The second question asked respondents to rate the importance of 17 criteria in recruiting or employing physicians. Potential responses were: very important, somewhat important, not very important, and not important. Table 2 presents the percentages of those responding who rated each selection criterion as either very important or somewhat important. All of the respondents indicated that board certification and/or eligibility of the physician was very or somewhat important. Over 90 percent of the respondents indicated that the following criteria were very or somewhat important: the physician's motivation and bedside manner, the physician's adaptability to the

TABLE 2

Percentages of 168 Leaders of Health Maintenance Organizations Who Rated Each of 17 Criteria as Important in Recruiting and Hiring Physicians, 1986*

Criterian	Very Important	Somewhat Important	Combined
Board certification and/or eligibility	74	26	100
Motivation	72	25	97
Bedside manner	58	38	96
Adaptability to changing environment	62	33	95
Ability to work in a team	74	21	95
Reputation of residency program	46	48	94
Trained in U.S. medical school	49	44	93
Ability to relate to nonphysician staff members	63	29	92
Reputation of medical school	31	54	85
Experience in practice	16	59	75
Curriculum in residency program	21	52	73
Clinical experience in HMO setting	23	47	70
Salary requested	13	55	68
Geographic preference	20	44	64
Age	7	39	46
Balance of males and females on staff	5	41	46
Curriculum in medical school	11	34	45

* Percentages were rounded to the nearest whole number. The number of respondents rating a specific criterion ranged from 144 to 164 because not all respondents rated all items. The possible responses were: very important, somewhat important, not very important, and not important.

changing practice environment, the physician's ability to work in a team, the reputation of the physician's residency program, the physician's training being done in a U.S. medical school, and the physician's ability to relate to nonphysician staff members. Least important were the physician's age and medical school curriculum and the balance of males and females on the HMO's staff.

Discussion

In their responses to the survey described here, the HMO leaders indicated concern about shortcomings of medical education that were remarkably consistent with opinions found in the literature (1–3). Many of these concerns also appear to be held increasingly by government, insurers, and industry in the United States, and they center on how best to train physicians to provide both high-quality and cost-effective care.

For example, the two areas most frequently cited as needing much greater emphasis in medical education, namely the cost-effective use of diagnostic and treatment services and skills in utilization review and quality assurance, may reflect the rising pressures from government and industry to reduce the rate of increase in health care costs. Indeed, the presumed ability of HMOs to minimize hospital admissions, control lengths of stay, and limit the use of diagnostic and treatment services is the reason they have received such strong support from government and industry. Prepayment for health care services and particularly the role of the primary care physician as "gate-keeper" offer potential solutions to the need to control use of health services and to seek the least expensive services appropriate to the patient's needs.

Other recommendations made by the respondents in the present study reflect similar concerns about the shortcomings of medical education. As hospital utilization declines, more and more diagnosis and treatment decisions are being made in ambulatory settings and at home; hence, the respondents expressed a need for clinical experience in ambulatory settings. Moreover, since health care is increasingly provided by teams of health professionals, there is an increased need for physicians to learn to work effectively on teams. Desire for increased emphasis on preventive medicine is probably related to the likelihood that it would reduce health care expenditures in the future, while increased emphasis on geriatrics probably reflects the rapid aging of the U.S. population.

On the other end of the scale, occupational medicine, epidemiology, emergency medicine, and inpatient training were seen as requiring less emphasis. Occupational medicine may be considered by HMOs as a specialty focused in employer-sponsored clinics or occupational health centers. HMO practice still revolves around the individual patient, and this may explain the lack of interest in epidemiology. The respondents may have considered emergency medicine to refer to true medical emergencies and not the urgent but nonemergency cases that account for a majority of visits to hospital emergency rooms. The interest in decreasing training time in inpatient settings is a natural corollary to the perceived need to emphasize further ambulatory experiences.

The importance of board certification or eligibility in selecting physicians was hardly surprising; however, the HMO leaders gave nearly equal weight to the physician's personal attributes and interpersonal skills. The physician's ability to work in a team and relate to nonphysician staff members were also rated highly. Motivation and adaptability to a changing environment are important in light of the cost-conscious and rapidly changing health care environment of the late 1980s. The importance of bedside manner to the HMO leaders may reflect the role of physician-patient interaction in generating patient satisfaction and, hence, HMO enrollments.

The reputation of the physician's residency programs and their being trained in U.S. medical schools were both rated as more important in hiring physicians than either the reputation of medical schools or the curriculum of residency programs. Least important in hiring was the medical school curriculum. While curricula were not rated as crucial in HMO hiring, the HMO leaders wanted to see far-reaching changes in both medical school and residency curricula to help produce physicians they consider better suited to practice in HMOs.

HMOs will select an increasing number of physicians from an increasing glut of graduates. Academic medical centers should seriously consider expanding their communication with HMO leaders so that they can take into account HMO needs and desires when redesigning their curricula and clinical experiences. In so doing, they are likely to make their graduates more competitive for HMO positions.

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the practices of the directors of residency programs at their affiliated institutions and make efforts to ensure that their application requirements are fair and educationally sound. The various organizations of residency program directors should exert pressure on their members to participate in the NRMP, to abide by its rules, and to eliminate the practice of requiring applicants to take on-site electives. The Association of American Medical Colleges and the American Medical Association could take the lead in establishing guidelines for acceptable practices and implementing them through their involvement in the Liaison Committee on Medical Education and the Accreditation Council for Graduate Medical Education.

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Survey of Departments of Obstetrics and Gynecology In U.S. and Canadian Medical Schools, 1965 to 1985

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A questionnaire was sent to all chairmen of medical school departments of obstetrics and gynecology in the United States and Canada under the auspices of the Undergraduate Education Committee of the Association of Professors of Gynecology and Obstetrics (APGO). It was designed to seek information about undergraduate medical education in obstetrics and gynecology and about the departments in which this education occurs. In this paper the authors present information gained from the questionnaire and compare it with information gained through similar surveys in 1965 and 1975 (1, 2).

Methods

In January 1985 the questionnaire was sent to the 144 chairmen of the departments of obstetrics and gynecology listed in the APGO registry. The seven-page questionnaire contained 11 groups of questions (including completion, scaled, and essay questions) about curriculum design and development, evaluation in undergraduate education in obstetrics and gynecology, and demographic information about the departments and the chairmen who led them. After a second mailing, a total of 115 (79.9 percent) responses were available for analysis. A portion of the information obtained was used in the preparation of this article. These data were analyzed using standard statistical methods. Where appropriate, the information was compared with similar published information for 1965 and 1975 (1, 2).

This report was adapted from a presentation at the Annual Meeting of the Association of Professors of Gynecology and Obstetrics, New Orleans, Louisiana, February 1986.

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Results

Between 1965 and 1975 there was a trend toward increased numbers of faculty members in departments of obstetrics and gynecology (2), but in the following decade there was relative stability in faculty size. In 1985 there was an average of 12.8 full-time faculty members with M.D. degrees per department (S.D. = 9.8, range = 0–80) and 2.5 full-time faculty members with Ph.D. degrees (S.D. = 2.8, range = 0–14). In comparison, the average number of full-time M.D. faculty members was 11.3 in 1975 and 6.4 in 1965, as indicated in Table 1. Part-time clinical faculty members comprised a significant part of the teaching faculty of many departments, with an average of 19.2 part-time M.D. faculty members per department in 1985 (S.D. = 31.6, range = 0–99). There was an overall average of 5.4 tenured faculty members per department in 1985 (S.D. = 4.6, range = 0–23). The mean number of residents taught by faculty members per department was reported as 19.2 in 1985 (range = 0–48), 18.7 in 1975, and 13.8 in 1965.

This trend toward stabilization in size and staffing was also seen in the obstetrics and gynecology clerkships that these faculty members taught. In 1985 the average number of students per clerkship was 16.7 (S.D. = 9.5, range = 0–50) compared with 17.8 students per clerkship in 1975 and 15.9 students per clerkship in 1965. Two schools were developing required clerkships in obstetrics and gynecology in 1985 and thus had no students in a required clerkship at the time of the questionnaire. There were 6 to 15 students per clerkship in 38.3 percent of the responding departments in 1985 compared with 45.1 percent of responding departments in 1975 and 61.6 percent in 1965. In contrast, there were 21 to 25 students in 12.1 percent of the 1985 sample compared with 15.2 percent of the 1975 sample and 5 percent of the 1965 sample. Large clerkships with more than 30 students per clerkship remained uncommon, being noted in 5.2 percent of the 1985 sample, 7.7 percent of the 1975 sample, and 3.3 percent of the 1965 sample. Clerkships averaged 6.9 weeks in length in 1985 (S.D. = 1.4, range = 4–12). This average clerkship length had not changed in the decade since the previous study. Of the respondents, 104 departments (90.4 percent) reported clerkships in the third year of medical school. The response of one department about clerkship format was not usable. Of the remainder, nine clerkships were held in the fourth year, and one was held in the second year. Combined clerkship formats that used second-, third-, and/or fourth-year components were reported by 21 departments.

The chairmen of the departments studied in 1985 averaged 53 years of age (S.D. = 6.7 years, range = 33–60]. Thirty-two of the 110 responding chairmen who gave their specialty were specialists in maternal-fetal medicine (29 percent), 24 were in gynecologic oncology (22 percent), 16 were in gynecologic endocrinology (15 percent), and 38 were in general ob-

TABLE 1

Numbers and Percentages of Medical School Departments of Obstetrics and Gynecology with Different Numbers of Full-Time M.D. Faculty Members in 1965, 1975, and 1985*

No. of Faculty Members	1965		1975		1985	
	No.	Percent	No.	Percent	No.	Percent
0–5	30	49.2	20	19.2	19	16.5
6–10	21	34.4	36	34.6	36	31.3
11–15	8	13.1	26	25.0	27	23.5
16–20	2	3.3	8	7.7	17	14.8
21–25	0	0	11	10.6	9	7.8
26–30	0	0	3	2.9	4	3.5
>30	—	—	—	—	3	2.6

* The 1965 and 1975 data are from Spellacy and colleagues (2).

stetrics and gynecology (34 percent). There was no significant difference in age based on subspecialty. Seven chairmen had both M.D. and Ph.D. degrees, one had an M.D. and D.V.M. degree, and the rest had M.D. degrees. The respondents had been chairmen an average of 7.9 years (S.D. = 6.7 years, range = <1–29 years). The chairmen were diverse in the number of journal articles they had published. A mean of 60 published articles was reported by the 115 chairmen who responded to this question (S.D. = 68, range = 0–400). Seventeen chairmen reported no published journal articles, while six reported more than 150 articles each. Membership in the Association of Professors of Gynecology and Obstetrics was common, with 108 of the 115 respondents (93.9 percent) reporting membership.

Discussion

During the decade between 1965 and 1975, medical schools responded to a demand for increasing numbers of physicians by expanding their faculties and facilities. In the ensuing decade, 1975 to 1985, the number of medical students no longer increased, and there was an increased emphasis on quality of medical education in a broad sense (3, 4). In obstetrics and gynecology, the development and revision of national undergraduate objectives is an example of the efforts to emphasize quality of medical education. In the 1975–1985 decade there was a stabilization in the numbers of students per clerkship and length of clerkships in obstetrics and gynecology and a tendency to develop departments with larger numbers of full-time and part-time clinical and basic science faculty members.

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Residency Directors' Perceptions of Gender-Related Differences In the Performance of Psychiatric Residents

Howard B. Roback, Ph.D., Miles K. Crowder, M.D., and Judith McNeeley, Ph.D.

Although psychiatry traditionally has been an attractive field for women, relatively few female psychiatrists hold prominent academic, research, or policy-making positions (1). Female psychiatrists not only have lamented the lack of female role models when they were trainees (2) but also have expressed concern about specific deficits in their education, such as lack of training in coping with sexual or aggressive responses by patients. In addition, female psychiatrists contend that supervisors avoid helping them explore their own conscious and unconscious reactions—for example, sexual—to patients (3). Female residents in general also believe that they are asked

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Informed Consent Policies Governing Medical Students' Interactions with Patients

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Abstract—When medical students become involved in patient care, concerns are raised that have ethical and possibly legal implications. In order to determine compliance with the guidelines of the U.S. government and the Joint Committee on Accreditation of Hospitals pertaining to informed consent, the authors conducted a study of hospital administrators, medical school department chairpersons, and medical school deans (with response rates ranging from 82.3 to 95.1 percent) concerning policies on student involvement in patient care. The results show that only 37.5 percent of all responding teaching hospitals specifically informed patients that students would be involved in care. Only 51 percent of the responding medical schools that specifically gave their students instruction or guidance on initial patient interaction as a matter of policy insisted that their students introduce themselves as students and clarify their role in patient care. The authors conclude that medical educators' compliance with the ethical requirements of informed consent is incomplete.

The involvement of medical students in the assessment and care of patients in teaching hospitals raises concerns that have ethical and possibly legal implications for students, the physicians responsible for their education, and the administrators of the teaching hospitals.

In order to guarantee the rights of patients in teaching hospitals, the U.S. government formally recommended that the functions of teaching hospitals be explained to all patients entering such institutions. Specifically, a 1973 U.S. commission report (1) states:

> . . . the patient who is about to enter such an institution should be told fully what to expect, that he will receive quality care, and that at small inconvenience if indeed any at all, he will also be making a contribution to the common good of all

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For related editorial, see page 861.

> future patients. His own doctor should tell him in advance that he is expected to cooperate with the teaching program and assure him that he will not be left to the mercy of the unskilled . . . Upon admission he should be given a statement explaining the educational aims and activities of the institution and told how students, interns, and residents will participate in his care.

In support of this recommendation, the Joint Committee on Accreditation of Hospitals (JCAH) promulgated the following guideline (2) regarding the rights of patients in teaching hospitals:

> The patient has the right to know the identity and professional status of individuals providing service to him. . . . this includes the patient's right to know of the existence of any professional relationship . . . to any . . . educational institutions involved in his care. Participation by patients in clinical training programs . . . should be voluntary.

The relationship between patients and students has been discussed in the philosophical (3) and legal context (4–6), but apparently no attempt has been made to go beyond anecdotal discussion. The current study provides systematic data on the origin and methods of implementation of policies governing medical students' involvement in the assessment and care of patients, as formulated by medical educators and hospital administrators.

The hypothesis of the study was that, despite clear federal recommendations and JCAH guidelines pertaining to the rights of patients in teaching hospitals and the responsibilities of medical educators and administrators, there would be a heterogeneity of opinion among the professionals responsible for the administration of teaching hospitals and the education of medical students with respect to the implementation of these guidelines. The authors felt that this heterogeneity of opinion among the medical education professionals would become manifest with a study of the origin and nature of medical school, clinical department, and teaching hospital policies governing student interaction with patients and the variable implementation of these policies where they exist.

Methods

During the 1984–85 academic year, questionnaires designed by the authors to study the origin, nature, and methods of implementation of medical school policies governing student involvement in the assessment and care of patients were mailed to the deans and clinical department chairpersons of internal medicine, general surgery, obstetrics-gynecology, and pediatrics of all 123 fully accredited four-year allopathic medical schools in the United States. The questionnaires sent to the deans specifically sought to identify whether the medical schools had actually developed policies governing students' behavior when interacting with patients and to define the specific nature of such policies. Similar questionnaires were sent to the clinical department chairpersons at the schools in order to determine whether a medical school's policy was being implemented by the various clinical departments at the school. In addition, these questionnaires specifically addressed the issue of student participation in selected invasive aspects of both physical examination and laboratory diagnostic and/or therapeutic evaluation (lumbar puncture, bone marrow aspiration, paracentesis).

Finally, questionnaires were mailed to the chief executive officers (CEOs) of 248 major teaching hospitals (two or more hospitals affiliated with each fully accredited U.S. medical school) requesting that the officers identify and describe hospital policies dealing with the issue of student involvement with patients that may have been developed independently of medical school policies. For each medical school, primary and secondary teaching hospitals were identified by the Association of American Medical Colleges (AAMC) *Directory of American Medical Education* (7), the directory of the AAMC's Council of Teaching Hospitals (COTH) (8), or direct inquiry to the office of the dean of each respective medical school. In instances where hospitals had affiliations with more than one medical school, selection of primary or secondary designation was based upon the authors' best estimate of the degree of affiliation as suggested by the COTH directory or by communication with the deans' offices. The secondary teaching hospitals were divided into two categories: Veterans Administration (VA) hospitals and "other" secondary hospitals (both public and private).

All the questionnaires were coded numerically prior to mailing so that individuals and institutions could not be identified during the analysis. Because of the categorical nature of the data, comparisons between groups were initially evaluated for statistical significance using the Mantel-Haenszel chi-square test (9).

Results

Response rates for deans, medical school chairpersons, and hospital chief executive officers are summarized in Table 1. The overall response rate for the deans' survey was 95.1 percent, and was virtually identical for private and public institutions. The response rates for the medical school chairpersons' was 82.3 percent overall and ranged from a low of 75.6 percent for surgical departments to a high of 87.8 percent for medicine departments. The response rate for the hospital CEOs was 84.7 percent and ranged from a low of 76.3 percent for "other" secondary hospitals (that is, those other than VA hospitals) to a high of 95.6 percent for VA hospitals.

TABLE 1

Numbers and Percentages of Medical School Deans, Clinical Department Chairpersons, and Hospital Chief Executive Officers Who Completed Questionnaires on Policies and Procedures Concerned with Informed Consent for Medical Student Participation in Patient Care and Treatment, 1984–85

Categories of Respondents[*]	Survey Sample	Respondents	
		No.	Percent
Deans of medical schools	123	117	95.1
Chairpersons of clinical departments			
Internal medicine	123	108	87.8
General surgery	123	93	75.6
Obstetrics-gynecology	123	103	83.7
Pediatrics	123	101	82.1
Total	492	405	82.3
Hospital chief executive officers			
Primary teaching hospitals	123	104	84.6
Secondary teaching hospitals[†]	125	106	84.8
Veterans Administration hospitals	45	43	95.6
Other secondary hospitals	80	63	76.3
Total	248	210	84.7

[*] Questionnaires were sent to the deans of all 123 fully accredited four-year medical schools in the United States and to the hospitals affiliated with them.

[†] Secondary hospitals were divided into two categories: Veterans Administration hospitals and all others (private and public).

In general, a majority of the 210 responding teaching hospitals did not specifically inform patients at the time of admission that medical students would be involved in their assessment and care, as shown in Figure 1. Only 37.5 percent of all responding CEOs stated that as a matter of policy their institutions specifically informed patients at the time of the admission about medical student involvement. Primary teaching hospitals were more likely to inform patients than either Veterans Administration hospitals or other secondary teaching institutions ($p < 0.01$). The 405 responding medical school clinical departments (internal medicine, general surgery, obstetrics-gynecology, and pediatrics) were more likely to inform patients specifically of medical student involvement in assessment and care than were the hospital administrative offices ($p < 0.001$). Compliance with federal recommendations and JCAH guidelines by the clinical departments ranged from 52.7 percent for surgery departments to 72.3 percent for pediatric departments.

An analysis of the responses from the medical school deans revealed that 98 (83.0 percent) of the 117 responding medical schools gave their students specific verbal or written instructions as to how to introduce themselves to patients and, therefore, clarify their role in patient assessment and care. Nineteen responding medical schools did not specifically instruct students about this aspect of patient interaction. An examination of the nature

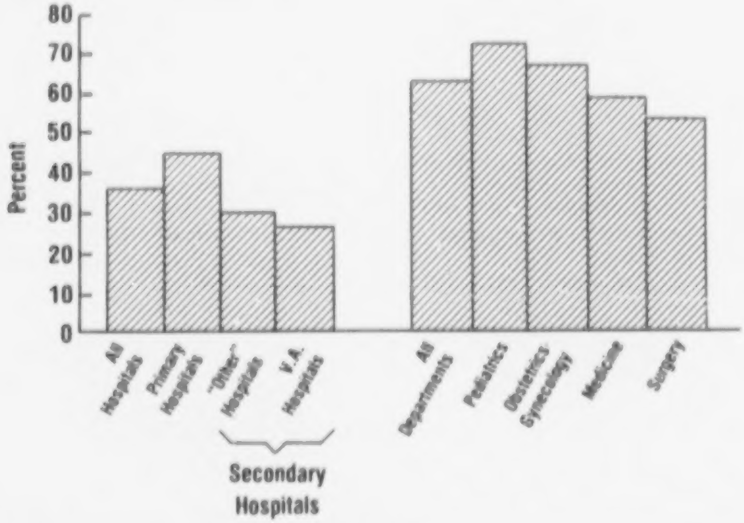

FIGURE 1

Percentages of 210 teaching hospitals (the primary teaching hospital and a secondary teaching hospital for each medical school, with the secondary hospital being either a Veterans Administration hospital or another secondary hospital) and percentages of 405 medical school clinical departments that specifically informed patients that medical students would be involved in their care and assessment (differences between all hospitals and all departments were significant at $p < .001$; differences between primary teaching hospitals and secondary teaching hospitals were significant at $p < .01$), 1984–85.

of the instruction and a comparison of it with instructions that students received independently at the teaching hospitals demonstrated a considerable heterogeneity of approaches among medical educators and administrators, as shown in Figure 2. Among these 98 medical schools, 51.0 percent specifically insisted as a matter of policy that students introduce themselves as students and thus clarify their role in patient care; 36.7 percent encouraged the students to be forthright but did not insist upon clarification of the student role; and 10.2 percent had no specific policy, although they instructed the students on this issue. A small percentage of the schools—2.1 percent—instructed their students to introduce themselves to patients as "Doctor" without further clarification of their undergraduate status. Medical school instructions were usually unwritten and were generally disseminated to students through courses in physical diagnosis or medical ethics or through clerkship orientation sessions. The department chairpersons took similar approaches with respect to the issue of clarification of the students' role.

The policies of the hospital CEOs were notably different. While 37.2 percent insisted that students clarify their role in patient care, 28.4 percent had no specific policy. Comments by several of the executive officers suggested that responsibility was left to the individual medical schools or clinical departments. However, this did not seem to be a formal arrangement.

Correlations between medical school policies (as revealed on the deans' questionnaires) and policies established by clinical department chairpersons at the same institutions were examined. Assuming that policy established by the deans and policy established by the clinical departments were not independent of each

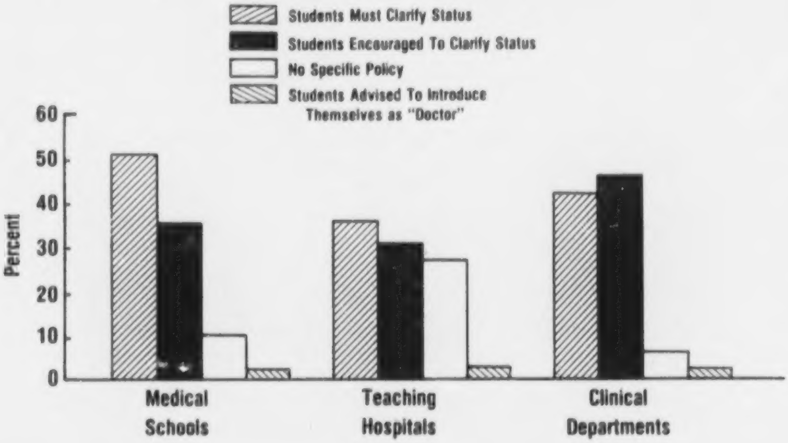

FIGURE 2

Percentages of 98 medical schools, 210 teaching hospitals, and 405 medical school clinical departments that gave each of four types of instructions (not including 17 medical schools that give no instruction) on the way students should introduce themselves when first meeting patients (comparison of schools with hospitals was significant at $p < .01$; comparison of clinical departments with hospitals was significant at $p < .001$; comparison of schools with clinical departments was not statistically significant), 1984–85.

other, the proportion of overall agreement between the two would reflect the degree to which the departments implemented the deans' policies. The responses showed that 36 to 56 percent of the departments complied with the policies of their deans (Table 2). However, if the assumption is that policy established by the deans and by the chairpersons were independent of each other, agreement beyond chance is best determined by calculation of the kappa value for measurement of non-chance agreement between pairs of observers (10). Kappa values of less than .40 are considered to represent poor agreement. Little correlation existed between deans and chairpersons beyond chance alone (with Kappa values ranging from −0.03 to 0.228). Hence, by either method of analysis, the medical school policies governing the ways students introduce themselves to patients was not consistently followed by the department chairpersons at the same institutions.

A final question dealt with the performance of invasive procedures by medical students: How do major clinical departments deal with the specific issue of informed consent from patients for medical students to participate in three invasive diagnostic or therapeutic procedures—lumbar puncture, paracentesis, and bone marrow aspiration? The results, shown in Figure 3, are limited to the departments of internal medicine and pediatrics because the three invasive procedures in question occur with highest frequency on those clinical services. The departments that stated that students were not permitted to perform invasive procedures or stated that invasive procedures were generally a rare occurrence were excluded from analysis (nine for internal medicine and 26 for pediatrics). In all instances, consent was obtained from patients for the procedures to be performed. The question here pertained to students' involvement in the procedures. In general, the departments of internal medicine and pediatrics approached the issue in the same manner. Most of these departments (65.3 percent for pediatrics and 72.7 percent for internal medicine) did not specifically inform patients (or the parent or guardian) that the students would actually perform the procedures. By their responses, these departments indicated that their position was that the team would do it together and did not designate who would actually perform the procedure. Unsolicited comments submitted by many department chairpersons expressed the opinion that medical students are members of the health care team and that

TABLE 2

Numbers and Percentages of Medical School Departments in Which Policies Concerning Clarification of Student Participation in Patient Care Implemented by the Clinical Chairpersons Agreed with Those Formulated by the Dean's Office in the Same Institution and the Kappa Value and Standard Error for the Kappa Value for Correlations Between the Two Sets of Policies, 1984–85*

Departments	No. of Dean-Chairperson Pairs	Percent	Kappa value	S.E. (k)
Medicine	86	43	.065	.08
Surgery	75	45	.127	.08
Obstetrics-gynecology	78	36	−.03	.09
Pediatrics	79	56	.228	.09

* The survey was conducted among all 123 fully accredited four-year medical schools in the United States and their affiliated teaching hospitals.

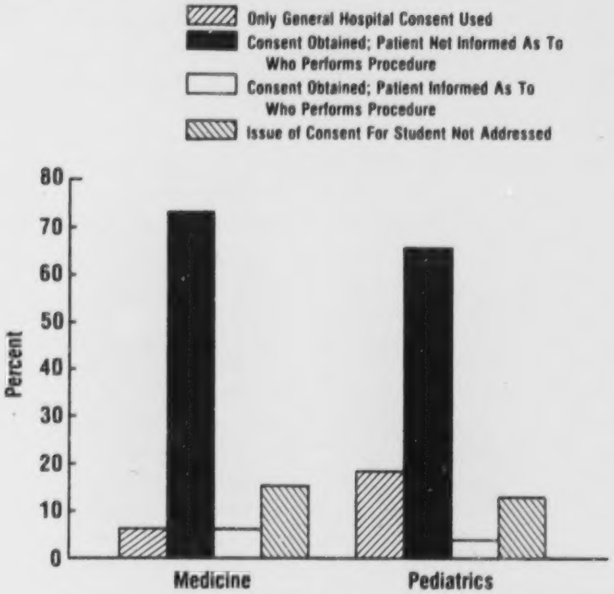

FIGURE 3

Percentages of 99 internal medicine and 75 pediatric medical school departments that used each of four approaches related to informed consent when students performed invasive procedures (lumbar puncture, bone marrow aspiration, paracentesis), 1984–85.

designation of their singular role in the performance of invasive procedures does not require further clarification. A small percentage (4.0 percent for pediatrics; 6.1 percent for internal medicine) of the clinical departments obtained consent from patients for the students to perform the procedure. Some departments (6.1 percent for internal medicine; 17.3 percent for pediatrics) did not obtain consent for specific invasive procedures but relied instead on the general consent form signed by patients (or the parent or guardian) on admission. Other departments (13.4 percent for pediatrics; 15.1 percent for internal medicine) did not specifically address the issue of informed consent for student performance of individual procedures in any manner.

For procedures requiring signed informed consent, it is customary to place on the consent form the names of all persons involved in the performance of particular diagnostic and/or therapeutic procedures. Regarding this practice, 13.2 percent of the chairpersons stated that the medical students' names were placed on consent forms for procedures the students might perform, 65.0 percent stated that this was not the practice on their clinical service, and 21.7 percent were unaware of their departmental practice.

Discussion and Conclusions

Teaching hospitals are unique environments designed to carry out major education and research while also offering high-quality medical care. They may, in fact, be intimidating to patients. Federal and JCAH guidelines make clear that patients admitted to teaching hospitals do not relinquish the right to be involved in decisions concerning their health care.

The involvement of medical students in patient care is an issue that has never been systematically examined. The ethical basis of and requirements for informed consent are fairly well developed in the bioethical and medical literature. Disclosing information to patients about their conditions and providing them an opportunity to participate in decisions about medical interventions promote the trust of the patient in the physician, and that trust is a beneficial consequence for the patient. Informed consent also is a way of implementing a patient's moral right to determine what happens to his body. Thus, informed consent is grounded in both beneficence and respect for autonomy, two basic ethical principles in medicine (11).

The requirements of informed consent are generally understood to be three: (*a*) the disclosure of an adequate amount of information, perhaps based on a "reasonable patient" standard, about the patient's condition and the various ways it might or might not be treated; (*b*) the patient's understanding of that information, that is, interpreting it in terms of his values and beliefs and arriving at a preference; and (*c*) the patient's voluntary choice of a preferred course of treatment or nontreatment (12).

Informed consent would require that (*a*) the patient be told explicitly that medical students will be involved in treatment and care; (*b*) the patient understand the level of knowledge, skill, and experience that medical students possess; and (*c*) the patient voluntarily consent to the involvement of medical students in treatment and care. Both the guidelines of the federal government and those of the JCAH reflect this procedure in the requirements of informed consent when students are involved in patient care.

The data reported raise a number of ethical concerns. The first has to do with who holds and should discharge the ethical obligation to patients in teaching hospitals to obtain their informed consent for the involvement of students in their treatment and care. This would seem to be a shared responsibility of the teaching hospital and its affiliated medical school. The hospital assumes the ethical obligation to provide care for patients it admits, and this would include obtaining informed consent for student participation. At the same time, the medical school bears direct responsibility for the training of students and thus bears direct responsibility for the supervision of students when they are involved in patient care. That supervision contains as one of its essential elements the obligation to obtain informed consent from patients who are to become "teaching material."

The problem revealed in the data presented here, that is, the failure of significant numbers of medical schools and their teaching hospitals to conform with the ethical requirements of informed consent, may reflect a problem endemic to all bureaucratic structures: the diffusion of responsibility to such an extent that each person in the structure assumes that someone else has already dealt with such matters as informed consent. The solution to this problem involves the unequivocal assignment of responsibility and the enforcement of that responsibility by those in charge of the institutions, namely, the dean of the medical schools and the chief executive officer of the teaching hospitals.

The second ethical concern has to do with the sort of consent that hospitals and medical schools should seek from patients in teaching hospitals. The present data suggest that a significant percentage of institutions rely on a "blanket" consent that does not explicitly include information about the involvement of medical students or information about which invasive procedures students might be performing. One justification for this may be that students are regarded as part of the health care team and that general or blanket consent covers their involvement in patient care. However, general or blanket consent becomes suspect because it does not satisfy the level of detailed disclosure required to obtain informed consent. Hence, blanket consent should be discarded in favor of more specific practices that come closer to meeting the three requirements of informed consent.

The third ethical concern involves the role of medical educators in the professional formation of medical students. As all those involved in medical education are aware, medical students do not come to their teachers fully formed in the ethical traditions of medicine; these have yet to be fully mastered and consistently displayed by them. As physicians know all too well, obtaining informed consent is sometimes a difficult matter, especially when the patient is being asked to consent to procedures that carry significant levels of risk. In such situations, physicians must learn to master their own anxiety and discomfort so that they will be better able to discharge their responsibilities regarding informed consent. Obtaining informed consent for the involvement of students in patient care can sometimes pose such difficulties—for attending physicians, residents, and students. By not obtaining explicit consent for student involvement in patient care, medical educators forfeit an important opportunity to cultivate students as ethically sensitive and responsible professionals.

Thus, instead of seeing informed consent for student involvement in patient care as merely one more legal or ethical burden, it should be seen positively, as an opportunity both to respect the patient's rights and provide significant benefit to the patient and to contribute to the development of the students' professional attitudes.

Summary

The authors studied the formulation and use of policy governing the interaction of medical students with patients in teaching hospitals in order to measure compliance with the federal and JCAH guidelines. The results showed that only 37.5 percent of all the responding teaching hospitals as a matter of policy specifically inform patients about the students' role in assessment and care. In many instances hospital administrators appeared to assume that this responsibility was discharged by the individual clinical departments (although the comments of responding chief executive officers suggested this was not a formal arrangement by any means).

Of the 83 percent of U.S. medical schools that give their students instructions with respect to patient interaction, only 51 percent insisted that students assume responsibility for clarification of their role in patient care. The implementation of medical school policy by the clinical departments is modest at best. Patient consent for medical student involvement in the performance of invasive procedures is not generally sought, and the student's role as a distinct member of the health care team is not specifically addressed.

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